NASA SP-7011 (142)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

WITH INDEXES

(Supplement 142)

JUNE 1975

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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NASA SP-7011 (142)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

(Supplement 142)

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in May 1975 in:

- *Scientific and Technical Aerospace Reports (STAR)*
- *International Aerospace Abstracts (IAA)*

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INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* (NASA SP-7011) lists 256 reports, articles and other documents announced during May 1975 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA)*. The first issue of the bibliography was published in July 1964; since that time, monthly supplements have been issued.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects of biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis is placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

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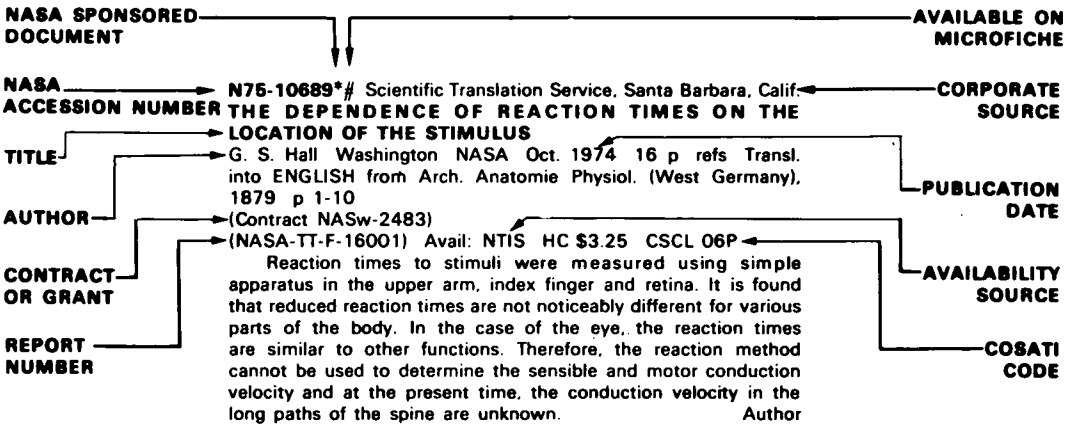

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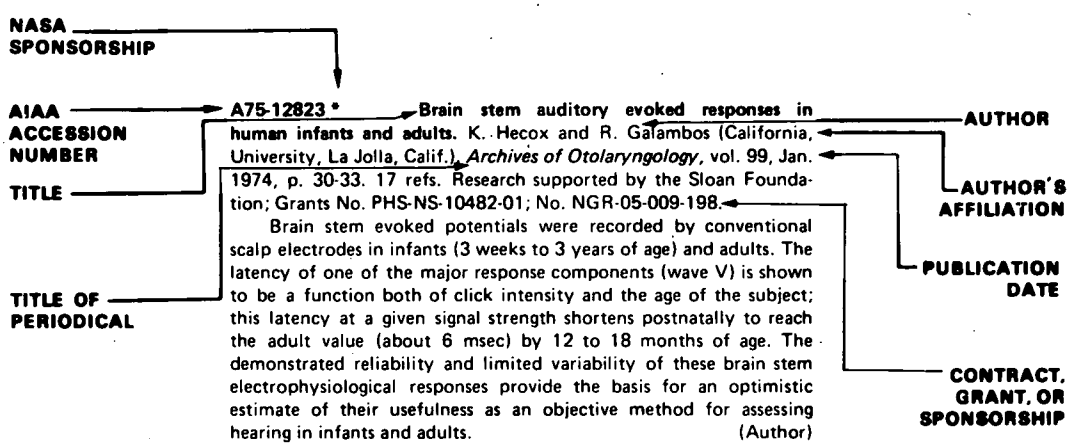

AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 142) JUNE 1975

IAA ENTRIES

A75-22888 * Flow and pressure regulation in the cardiovascular system. A. Iberall (General Technical Services, Upper Darby, Pa.). In: Flow: Its measurement and control in science and industry. Volume 1. Part 3. Pittsburgh, Pa., Instrument Society of America, 1974, p. 1121-1134. 49 refs. Army-supported research; Contract No. NASw-1815.

Principles and descriptive fragments which may contribute to a model of the regulating chains in the cardiovascular system are presented. Attention is given to the strain sensitivity of blood vessels, the law of the autonomy of the heart beat oscillator, the law of the encapsulation of body fluids, the law of the conservation of protein, the law of minimum 'arterial' pressure, the design of the 'mammalian' kidney, questions of homeokinetic organization, and the development of self-regulatory chains. Details concerning the development program for the heart muscle are considered along with the speed of response of the breathing rate and the significance of the pulmonary vascular pressure-flow characteristics. G.R.

A75-22891 * Rheological properties of RBC in the microcirculation of mammalian skeletal muscle. M. H. Ehrenberg (General Biomedical Laboratories, Philadelphia, Pa.). In: Flow: Its measurement and control in science and industry. Volume 1. Part 3. Pittsburgh, Pa., Instrument Society of America, 1974, p. 1451-1458. 12 refs. Grant No. NIH-FR-72; Contract No. NASw-1066.

In the investigation the established technique of direct microscopic viewing was combined with the use of a closed circuit television system and cinematography. The red cell flow patterns in all capillaries were found to be oscillatory with characteristic cycle frequencies and amplitudes for all concentrations of inspired oxygen greater than 8%. Generally, there was a transient decrease in mean flow rate with increasing severity of hypoxia, with a gradual return toward control values. Red cell flow patterns are discussed along with questions of red cell configuration. G.R.

A75-22914 Pioneer 10 Jovian encounter - Radiation dose and implications for biological lethality. M. W. Miller, G. E. Kaufman, and H. D. Maillie (Rochester, University, Rochester, N.Y.). *Science*, vol. 187, Feb. 28, 1975, p. 738, 739.

In its recent Jupiter flyby Pioneer 10 passed through a belt of intense particulate radiation. The radiation dose on the outer surface of the spacecraft was at least 490,000 rads from electrons plus 2.9 million rads from protons, sufficient to cause significant microbial decontamination. The radiation dose inside Pioneer 10, approximately 280,000 to 490,000 rads, was less likely to cause microbial decontamination but would be lethal to man and to most multicellular biological organisms. (Author)

A75-22949 Synchronization of human motor units Possible roles of exercise and supraspinal reflexes. H. S. Milner-Brown, R. B. Stein, and R. G. Lee (Alberta, University, Edmonton; Calgary, University, Calgary, Canada). *Electroencephalography and Clinical Neurophysiology*, vol. 38, Mar. 1975, p. 245-254. 37 refs. Research supported by the Medical Research Council and Muscular Dystrophy Association of Canada.

Synchronization of motor units arising from regular use of muscles to exert large, brief forces is hypothesized. Records were made, first from the first dorsal interosseus muscle of the hand in seven weightlifters and seven control subjects, and second from four subjects before and after six weeks of doing a specific exercise involving the same muscle, and from reflex responses to nerve stimulation of four weightlifters and five control subjects. In the first two studies, electromyograms were made from the first dorsal interosseus hand muscles, while in the third study, the median nerve was stimulated and evoked responses measured in the thenar muscles, cervical spinal cord, and the contralateral 'hand' area of the primary motor and somatosensory cortical areas. Definite synchronization of the motor units in hand muscles was found and is ascribed to enhancing of supraspinal connections from motor cortex directly to spinal motoneurons, as a result of training to the point where they produce significant synchronization of motor units during steady, voluntary contractions. F.G.M.

A75-22950 Motor potentials and the timing of muscular activity. J. G. Jones (Alberta, University, Edmonton, Canada; Western Australia, University, Nedlands, Australia) and C. H. Beck (Alberta, University, Edmonton, Canada). *Electroencephalography and Clinical Neurophysiology*, vol. 38, Mar. 1975, p. 273-279. 9 refs.

Coincidence of dominant components of the motor potential recorded from the scalp with the rise and fall of muscular activity in single movements and return movements in serial flexion and extension of the elbow was tested. EEG recordings obtained from two right-handed subjects through scalp electrodes were averaged by computer and related to EMG, force and displacement of the arm. Coincident events in the motor potential indicated the rise and fall of EMG and force in the single movements, while in the return movements events in the motor potential also coincided with the rise of EMG and force in the first phase and the rise of EMG in the second phase. Relationships in events were clearer in one subject, due either to different performance characteristics or placement of the scalp electrodes. The general waveform of the motor potentials and the EMG traces were seemingly related in a few samples of single movements, suggesting a relationship of other factors than time between the motor potential and EMG. F.G.M.

A75-22951 Weightlessness: Medical-biological investigations (Nevesomost': Mediko-biologicheskie issledovaniia). Edited by V. V. Parin, O. G. Gazenko, E. M. Iuganov, P. V. Vasil'ev, and I. I. Kas'ian. Moscow, Izdatel'stvo Meditsina, 1974. 451 p. 1225 refs. In Russian.

Papers are presented in which numerous data from tests on the effect of zero-gravity on man and animals are reproduced and evaluated. Records of the physiological states of astronauts during orbital flight are presented, and the chief characteristics of man's reaction and adaptation to weightlessness are described on the basis of analysis of test material. Some of the topics covered include time perception during short-term weightlessness, the space form of motion sickness, vestibular reactions of astronauts in Voskhod missions, a pathophysiological analysis of the effect of weightlessness, and methods of training men for long-duration space missions. P.T.H.

A75-22952 # **Physiological problems of weightlessness (Fiziologicheskie problemy nevesomosti).** P. V. Vasil'ev and I. I. Kas'ian. In: Weightlessness: Medical-biological investigations. Moscow, Izdatel'stvo Meditsina, 1974, p. 7-18. In Russian.

The present work describes briefly and in general terms the principal physiological disturbances as experienced by Soviet and American crew members on space missions. The types of regular supervision of physiological indices carried out on all Soviet missions are listed for each flight. Areas where attention should be focused on future missions are pointed out. P.T.H.

A75-22953 # **Reactions of astronauts under zero-gravity conditions (Reaktsii kosmonavtov v usloviiakh nevesomosti).** I. I. Kas'ian, V. I. Kopanev, and V. I. Iazdovskii. In: Weightlessness: Medical-biological investigations. Moscow, Izdatel'stvo Meditsina, 1974, p. 18-33. In Russian.

Physiological indices of astronauts recorded during short-duration zero-gravity conditions (airplane flight along a parabolic Kepler path) and long duration zero-gravity conditions (actual space missions) are presented and discussed. The value of Kepler path zero-gravity experiments was shown in that for two of the astronauts studied, the same fluctuations of physiological indices were observed in both their short- and long-term flights. The individuality of each subject's reaction to weightlessness was also established. P.T.H.

A75-22954 # **Some physiological mechanisms for the effect of weightlessness on an organism (O nekotorykh fiziologicheskikh mekhanizmakh vliianiia nevesomosti na organizm).** I. I. Kas'ian and V. I. Kopanev. In: Weightlessness: Medical-biological investigations. Moscow, Izdatel'stvo Meditsina, 1974, p. 33-40. In Russian.

The present work summarizes the main general conclusions that can be drawn from the present volume of data on man's reaction to weightlessness as obtained in experiments and on space missions. Physiological reactions to weightlessness can be said to be caused by two principle factors: (1) the immediate effect of weightlessness resulting from the disappearance of the bodily weight of tissues and organs, and (2) the indirect effect resulting from change in the functional state of the central nervous system and the associated functioning of the analyzers. Four stages in a human's reaction to weightlessness are discerned: (1) a short transition period (1-24 hours), (2) initial adaptation with readjustment of all functional systems, (3) adaptation to the unusual mechanical conditions of the external media (from about the third to eighth day), and (4) a possible disbalance of functions and systems, observed in some astronauts after extended periods of weightlessness. P.T.H.

A75-22955 # **Reactions of animals and humans under conditions of short-term weightlessness (Reaktsii zhivotnykh i liudei v usloviiakh kratkovremennoi nevesomosti).** L. A. Kitaev-Smyk. In: Weightlessness: Medical-biological investigations. Moscow, Izdatel'stvo Meditsina, 1974, p. 41-66. In Russian.

Results of experiments are presented and evaluated in which the physiological reactions of animals and humans were recorded as they were subject to cyclical short periods of weightlessness induced by parabolic flight in an aircraft. In most human subjects there appeared sensor reactions in the form of spatial and visual illusions, motor excitations, and vestibulo-vegetative disturbances. These effects disappeared in the majority of subjects after many repetitions of the tests. P.T.H.

A75-22956 # **Time perception under conditions of short-term weightlessness (O vospriiatii vremeni v usloviiakh kratkovremennoi nevesomosti).** V. I. Lebedev, I. F. Chekirda, and I. A. Kolosov. In: Weightlessness: Medical-biological investigations. Moscow, Izdatel'stvo Meditsina, 1974, p. 66-70. In Russian.

An experiment is described in which human subjects while exposed to short periods of weightlessness induced by parabolic flight of an aircraft, made estimates of time elapsed as they performed various tasks. Their estimates were compared with estimates of the time elapsed as they performed the same tasks during normal, horizontal flight. These results were correlated with data on the subjects' emotional states at the time of the tests. Underestimation of time intervals during weightlessness was found to correlate well with positive emotional states, and overestimation of time intervals was found to correspond similarly to negative states. P.T.H.

A75-22957 # **Statokinetic reactions of man under conditions of short-term weightlessness (Statokineticheskie reaktsii cheloveka v usloviiakh kratkovremennoi nevesomosti).** I. A. Kolosov. In: Weightlessness: Medical-biological investigations. Moscow, Izdatel'stvo Meditsina, 1974, p. 70-75. In Russian.

Sensor, vegetative, motor, and vestibulo-somatic reactions during short-term weightlessness induced by parabolic flight of an aircraft were studied in a group of human subjects which included persons having many hours of flying time and some inexperienced persons in order to find a correlation between the extent of reaction to weightlessness and adaptation to weightlessness and a person's flight experience. Statokinetic disturbances were observed more rarely in flight personnel with a high degree of training. P.T.H.

A75-22958 # **Space form of motion sickness (Kosmicheskaia forma bolezni dvizheniia).** G. L. Komendantov and V. I. Kopanev. In: Weightlessness: Medical-biological investigations. Moscow, Izdatel'stvo Meditsina, 1974, p. 75-83. In Russian.

The present work describes the nature of motion sickness as it has been reported in astronauts on space missions. Although the space form of motion sickness displays the same general symptoms as sea and air sickness, some peculiarities are evident. For example, all astronauts who have had the signs of motion sickness have reported that their ability to function was not seriously impaired by their condition. Also, a rather long latency period is characteristic for the development of a motion sickness state from onset of the effect of weightlessness - usually not less than four hours. P.T.H.

A75-22959 # **Vestibular reactions of astronauts in flight aboard Voskhod (Vestibuliarnye reaktsii kosmonavtov pri polete na korable 'Voskhod').** E. M. Iuganov, A. I. Gorshkov, I. I. Kas'ian, I. I. Brianov, I. A. Kolosov, V. I. Kopanev, F. A. Solodovnik, V. I. Lebedev, and N. I. Popov. In: Weightlessness: Medical-biological investigations. Moscow, Izdatel'stvo Meditsina, 1974, p. 83-88. In Russian.

The present work describes some results of vestibulo-sensory, motor, and vegetative reaction tests carried out by Voskhod astronauts on themselves during the course of their space mission. In the preparation period before the flight, training was carried out in such a way that at the time of the flight, the three astronauts had distinct degrees of vestibular stability. In this way it was possible to correlate some of the results of the inflight tests with the astronauts' preflight vestibular stability. In general, it was borne out that the astronaut with best preflight preparation and adaptive training of the vestibular analyzer showed less vestibular disorders during weightlessness. P.T.H.

A75-22960 # **Blood circulation under conditions of weightlessness (Krovoobrashchenie v usloviiakh nevesomosti).** I. I. Kas'ian, V. I. Kopanev, and V. I. Iazdovskii. In: Weightlessness: Medical-biological investigations. Moscow, Izdatel'stvo Meditsina, 1974, p. 89-105. In Russian.

The present work reproduces and summarizes numerous data obtained on the variation of various blood circulation indices of animals and human subjects during weightlessness of orbital flight or that produced by parabolic flight of an aircraft. Although, in general, the effect of lowered pulse rate and lowered blood pressure is

observed in astronauts during weightlessness, no definite dependence between the fall of cardiovascular system function and time of stay in weightlessness has been established. It appears that the organism strives to maintain vegetative functions at a level sufficient for normal activity of the most important organs. Thus, for example, blood pressure never drops more than 10-15%. Moreover, the nervous-emotional excitation under flight conditions tends to increase blood pressure and pulse rate, thereby compensating in part for the effect of weightlessness. P.T.H.

A75-22961 # **Some results of medical investigations on crew members of the Voskhod-2 space vehicle (Nekotorye rezul'taty meditsinskikh issledovanii chlenov ekipazha kosmicheskogo korablia 'Voskhod-2').** I. I. Kas'ian, D. G. Maksimov, I. T. Popov, D. G. Terent'ev, and L. S. Khachatur'iants. In: Weightlessness: Medical-biological investigations. Moscow, Izdatel'stvo Meditsina, 1974, p. 105-116. In Russian.

The present work reproduces the data in which were recorded the changes in various physiological parameters of the two astronauts who manned the Voskhod-2 space mission. In this flight, one of the astronauts, Leonov, stepped out of the cabin and orbited along side the spacecraft, attached by a tether. Data recorded included EEG indices, ECG indices, body temperature, breathing rate, and EOG indices. After return to earth, additional tests were performed, such as algesic and tactile sensitivity tests, operational memory tests, and curve tracing tests. The astronauts displayed only slightly decreased performance. There were no significant differences between the astronauts' conditions just before the flight and one month after return. P.T.H.

A75-22962 # **Principal results of medical studies of Soyuz spacecraft crewmembers (Osnovnye rezul'taty meditsinskikh issledovanii chlenov ekipazhei kosmicheskikh korablei 'Soiuz').** N. N. Gurovskii, A. D. Egorov, L. I. Kakurin, and Iu. G. Hefedov. In: Weightlessness: Medical-biological investigations. Moscow, Izdatel'stvo Meditsina, 1974, p. 116-132. In Russian.

Results of biomedical studies of all the Soyuz spacecraft crews are reported in regard to phenomenological changes in the various organic systems under conditions of long-term weightlessness, the state of reserve resources of the human organism upon return to normal conditions after space flights of long duration, the dynamics of work capabilities of the astronauts, and evaluation of the results of specific tests. The general characteristics of flight conditions and the medical monitoring system are described, and graphs of physiological functions are supplied. Initial changes in heart rate and other functions and the lack of any change in speech, motor activity, coordination, and efficiency are discussed. Post-flight effects reported by astronauts are evaluated, and some conclusions regarding further in-flight biomedical studies are drawn. F.G.M.

A75-22963 # **Condition of the astronauts' cardiovascular systems during the flight of the Salyut orbital station (Sostoianie serdechno-sosudistoi sistemy kosmonavtov vo vremia poleta orbital'noi stanstii 'Saliut').** V. A. Degtiarev, I. I. Popov, T. V. Batenchuk-Tusko, N. D. Kolmykova, N. A. Lapshina, Z. A. Kirillova, V. G. Doroshev, and Iu. A. Kukushkin. In: Weightlessness: Medical-biological investigations. Moscow, Izdatel'stvo Meditsina, 1974, p. 132-157. In Russian.

Extensive medical testing was performed on the three-man crew of the Salyut space station which orbited the earth in 1971. A special testing apparatus, designated Polinom-2M, was carried on board for periodic monitoring of cardiovascular indices. Tests were made when negative pressure was applied to the astronauts' lower extremities and when they performed series of knee bends. The effects of prolonged space flight on human beings were considerably elucidated by these tests. Under rest conditions in space flight, in contrast to klinostatic hypodynamia on the ground, there is a greater tendency for the minute volume of the blood to increase and for the speed of propagation of the pulse wave to decrease. Some circulation indices varied widely on different days. The condition of the cardiovascular system was affected by weightlessness, emotional stress, rest, and other factors. A.T.S.

A75-22964 # * **External respiration, gas exchange, and energy losses under conditions of weightlessness (Vneshnee dykhanie gazo-oburen i energotraty v usloviiakh nevesomosti).** I. I. Kas'ian and G. F. Makarov. In: Weightlessness: Medical-biological investigations. Moscow, Izdatel'stvo Meditsina, 1974, p. 157-175. In Russian.

Studies performed with the crew members of Vostok 2, and Soius 4 and 9 indicate that long-term weightlessness has the effect of intensifying such metabolic processes as external respiration, gas exchange, and energy losses. The influence on respiration was evidenced by an increased respiration rate at the beginning of the mission and prior to reentry. During the flight itself, the rate was found to depend on the physical and psychical loads. Maximum increase in metabolic intensity was observed during the first five days of flight, the intensity decreasing somewhat during the following period (up to 18 days). The initial increase in metabolic intensity is attributed to a general nonspecific reaction of the organism to the change in ambient conditions. V.P.

A75-22965 # **Blood content of urea, sugar, unesterized fatty acids, and cholesterol under conditions of prolonged weightlessness (Soderzhanie v krovi mocheviny, sakhara, neesterifitsirovannykh zhirnykh kislot i kholesterina pri dlitel'noi nevesomosti).** I. S. Balakhovskii and T. A. Orlova. In: Weightlessness: Medical-biological investigations. Moscow, Izdatel'stvo Meditsina, 1974, p. 175-187. In Russian.

A75-22966 # **The influence of weightlessness on mineral saturation of bone tissue (Vliianie nevesomosti na mineral'nuiu nasyshchennost' kostnoi tkani).** I. G. Krasnykh. In: Weightlessness: Medical-biological investigations. (A75-22951 09-52) Moscow, Izdatel'stvo Meditsina, 1974, p. 187-192. In Russian.

Demineralization of bone tissue (osteoporosis) during space flight is studied. X-ray photometry of the right heel bones and right hand phalanges of astronauts onboard Soyuz 4, 5, and 9 and Salyut indicates noticeable demineralization. Decalcification in Gemini 4 and 5 astronauts is also discussed. Tabulated data show that demineralization of bone tissue begins early and progresses rapidly with time, even during brief periods of weightlessness. Preventive measures, including physical exercise, pharmacological preparations, and additives in water rations are proposed, and possible interactions between demineralization and other pathological processes observed during weightlessness are described. F.G.M.

A75-22967 # **Ways to orient the body in space during the absence of resistance under conditions of weightlessness (Sposoby orientatsii tela v prostranstve pri otsutstvii spory v usloviiakh nevesomosti).** A. V. Eremin, V. I. Stepantsov, I. F. Chekirda, I. P. Borisenko, and I. A. Kolosov. In: Weightlessness: Medical-biological investigations. Moscow, Izdatel'stvo Meditsina, 1974, p. 193-203. In Russian.

Ways to orient the body in relation to pitch, yaw, and rolling during zero g are developed. Rational orientation techniques are constructed by first computing the values and ratios of the moments of inertia of the different parts of the body and then determining how movements of the limbs will affect orientation through the three axes. Experiments conducted under conditions of weightlessness in a flying laboratory and a water medium are described, and the resulting data are tabulated. It is found that simple movements of the two arms or two legs together will move the body in the desired direction through the desired axis. F.G.M.

A75-22968 # **Motor activity of cosmonauts at zero g (Dvigatel'naia deiatel'nost' kosmonavtov v bezopornom sostoianii).** I. I. Kas'ian, I. A. Kolosov, and V. I. Kopanev. In: Weightlessness: Medical-biological investigations. Moscow, Izdatel'stvo Meditsina, 1974, p. 203-212. In Russian.

Tests in which Soviet astronauts carried out extensive motor activity are described. Zero-g conditions were created by parabolic aircraft flights during which astronauts practiced walking around and leaving and entering airlocks. In the case of Beliaev and Leonov (Voskhod-2), slight changes in finely coordinated activities were

detected during the first few tests, but these changes disappeared with repetition. It is noted that Edward White had similar experiences during his EVA from Gemini 4. Pulse and respiration rates were also measured during the motor tests and were found to be relatively normal. Analysis of the physiological reactions of astronauts to zero-g conditions shows that motor coordination, orientation, and ability to work are not significantly impaired, but finely coordinated activities, such as entering and leaving a spacecraft, had to be repeated not less than four to six times before they could be properly carried out. Tables and photographs illustrate the tests and results. F.G.M.

A75-22969 # **Bioelectric activity of skeletal muscles under the combined effect of overloads and weightlessness (Bioelektricheskaia aktivnost' skeletnoi muskulatury v usloviiakh peremezhaiushchegosia deistviia peregruzok i nevesomosti).** E. M. Iugamov, I. I. Kas'ian, and B. F. Asiamolov. In: Weightlessness: Medical-biological investigations. Moscow, Izdatel'stvo Meditsina, 1974, p. 213-218. In Russian.

A75-22970 # **Motor activity under conditions of weightlessness (Dvigatel'naia aktivnost' v usloviiakh nevesomosti).** I. I. Kas'ian, V. I. Kopanev, M. A. Cherepakhin, and E. M. Iuganov. In: Weightlessness: Medical-biological investigations. Moscow, Izdatel'stvo Meditsina, 1974, p. 218-236. In Russian.

The influence of short-term and long-term weightlessness on the functional state of the motor analysor is studied on the basis of data obtained during space missions. The changes in the muscular force of the wrist prior to and after a space flight are examined. The study indicates that there are not appreciable changes in motor activity (except for a slight discoordination of motion) when the astronaut is strapped to his seat. The opposite is true, however, under conditions of free floating, when the astronaut attempts to keep his body in a certain equilibrium with respect to the surrounding objects. Possible physiological mechanisms of motor disorder are examined. V.P.

A75-22971 # **Pathophysiological analysis of the effect of weightlessness on an organism (Patofiziologicheskii analiz deistviia na organizm nevesomosti).** E. A. Kovalenko. In: Weightlessness: Medical-biological investigations. Moscow, Izdatel'stvo Meditsina, 1974, p. 237-278. In Russian.

The physical changes which occur when a body is removed from the influence of the earth's gravity are considered. The absence of gravity fields causes macroscopic deformations of the organism, and may also have effects at the atomic and molecular levels. Weightlessness is considered the main etiological factor in the changes which occur during space flight, and the pathogenesis of specific effects is examined. The review takes into account a broad range of literature on Soviet and American space flights involving both animals and humans. The effects of weightlessness which are discussed include vestibular and sensory changes, the impairment of cardiovascular function, changes in salt metabolism, changes in muscle tone and coordination, changes in the skeletal system and calcium metabolism, and changes in gaseous metabolism and catabolism. A.T.S.

A75-22972 # **Prevention of harmful effects of weightlessness on the human organism (O profilaktike neblagopriiatnogo vliianiia nevesomosti na organizm cheloveka).** P. V. Vasil'ev. In: Weightlessness: Medical-biological investigations. Moscow, Izdatel'stvo Meditsina, 1974, p. 278-298. In Russian.

The review covers the possible harmful effects of long periods of weightlessness during space flight and methods which have been studied for preventing such effects. The production of artificial gravity is the single universal preventive measure, but spacecraft rotation presents other problems requiring further research. Other methods are directed at specific pathogenic links or individual symptoms. These techniques include the use of special space suits, apparatus for producing negative pressure on the lower extremities, various medications, and physical exercise. A.T.S.

A75-22973 # **Means and methods for physical training of men in long-term space flights (Sredstva i metody fizicheskoi trenirovki cheloveka v dlitel'nykh kosmicheskikh poletakh).** V. I. Stepantsov, A. V. Eremin, and M. A. Tikhonov. In: Weightlessness: Medical-biological investigations. Moscow, Izdatel'stvo Meditsina, 1974, p. 298-313. In Russian.

A complex of physical exercises that can assure proper physiological functions under conditions of weightlessness during long-term space flights is examined, and the equipment for performing these exercises is described. The exercises are designed to maintain proper functioning of all muscle groups and the cardiovascular system, and normal performance of locomotive actions. The training equipment includes an electrically driven treadmill, a gravity system, a weighted training suit, special footwear, an adjustable crossbar, and a collection of multisectional expanders. Experimental use of this equipment and its actual use onboard Soyuz-9 and the Salyut orbiting station are described, and data relating to performance of the various exercises are tabulated. F.G.M.

A75-22974 # **The problem of artificial gravitation from the viewpoint of experimental physiology (Problema iskusstvennoi gravitatsii s pozitsii eksperimental'noi fiziologii).** E. M. Ivganov and M. D. Emel'ianov. In: Weightlessness: Medical-biological investigations. Moscow, Izdatel'stvo Meditsina, 1974, p. 314-318. In Russian.

The technique of creating artificial gravity by rotating a spacecraft or orbiting station is examined. Early experiments in artificial gravity are recounted in the context of determining a safe rotational velocity that will permit activity on board the vehicle. It is found that a force of 0.28-0.31 g. is the minimum necessary to maintain normal motor activity. The creation of artificial gravity of this magnitude by varying the angular velocity of a rotating satellite independent of its rotational radius is described and experimental data explaning this technique are included. F.G.M.

A75-22975 # **Training of cosmonauts under conditions of weightlessness in airplane laboratories for working in space (Podgotovka kosmonavtov na samoletakh-laboratoriiakh v usloviiakh nevesomosti k trudovoi deiatel'nosti v kosmose).** E. V. Khrunov, I. F. Chekirda, and I. A. Kolosov. In: Weightlessness: Medical-biological investigations. Moscow, Izdatel'stvo Meditsina, 1974, p. 319-325. In Russian.

Training programs in which astronauts perform various mechanical tasks in weightless conditions are discussed. In flying laboratories, astronauts are trained to deal with special conditions in upcoming space flights, such as piloting operations, handling equipment and instruments, and coordination between human and mechanical systems. Individual psychological reactions to weightlessness are also tested. In particular, astronauts practice performing scientific and technical experiments, preparatory operations for EVA, putting on and taking off spacesuits, moving in outer space, and carrying out emergency operations. Specific training techniques are described, and experiences with the various techniques are examined. F.G.M.

A75-22976 # **Preservation of man's efficiency during long-term space flight (K voprosu o sokhranenii rabotosposobnosti cheloveka v usloviiakh dlitel'nogo kosmicheskogo poleta).** A. V. Eremin, R. M. Bogdashevskii, and E. F. Baburin. In: Weightlessness: Medical-biological investigations. Moscow, Izdatel'stvo Meditsina, 1974, p. 326-341. In Russian.

It is shown that the changes in the functional state of the principal systems of the human organism during space flight occur in certain stages that are closely associated with the duration of the flight. A characteristic of the changes in cosmonaut efficiency is that, in addition to the regular diurnal phases, there exist secondary phases, whose occurrence covers the entire flight period, and which are associated with the stages of adaptation to weightlessness and to other unfavorable factors. (Some of the secondary phases need not manifest themselves during short-duration missions.) The 'disorgani-

zation' phenomenon is seen to be largely responsible for the development of these stages and phases. V.P.

A75-22977 # Activity of astronauts in weightlessness and in free space (Deiatel'nost' kosmonavtov v nevesomosti i bezopornom prostranstve). E. A. Ivanov, V. A. Popov, and L. S. Khachatur'iants. In: Weightlessness: Medical-biological investigations. Moscow, Izdatel'stvo Meditsina, 1974, p. 341-380. In Russian.

Various aspects of the ability of astronauts to function during space flight are investigated. The effects of weightlessness alone and the additional effects of extra-vehicular activity are considered. The motor activity of the Voskhod-2 pilots and their ability to perform tasks, such as transmitting Morse code, are discussed in detail in order to illustrate the psychophysiological effects encountered inside and outside the spacecraft. Studies have shown that prolonged weightlessness affects the lability of memory and, thus, the astronauts' operational memory. The Voskhod and Soyuz flights have also yielded information on the changes which affect dynamic motor characteristics and vision during weightlessness. The psychophysiological analyses performed have shown that after a suitable adaptation period, the astronaut is a reliable link in the control system of a complex space flight. A.T.S.

A75-22978 # Some results of medical-biological research accomplished in the Gemini and Apollo programs (Nekotorye rezul'taty mediko-biologicheskikh issledovanii, vypolnennykh po programme 'Dzhemini' i 'Apollon'). V. I. Kopanev and E. M. Iuganov. In: Weightlessness: Medical-biological investigations. Moscow, Izdatel'stvo Meditsina, 1974, p. 381-428. In Russian.

A review was made of the American scientific literature on the Apollo and Gemini programs in order to reach general conclusions concerning the medical and biological effects of space flight on human beings. Several common aspects of the 21 flights considered make meaningful generalizations possible: the similar flight durations (0.4-14 days); the fact that crews of two or three, rather than individuals, were involved; the similar nature of the work, rest, and eating schedules; and the performance of similar tasks, such as rendezvous, docking, and space walks. The most important organic effects, which are discussed in detail, were changes in the body weight, the cardiovascular system, the blood, mineral and electrolyte metabolism, and work capacity. Some techniques for avoiding the negative organic effects of space flight are discussed. A.T.S.

A75-22985 # Automatic detection of arrhythmia on an electrocardiogram with the aid of a computer (Avtomaticheskoe raspoznavanie aritmii po elektrokardiogramme s pomoshch'iu EVM). Z. L. Dolabchian, E. Kh. Slkuni, E. M. Krishchian, and N. G. Tatinian (Ministerstvo Zdravookhraneniia Armianskoi SSR, Institut Kardiologii i Serdechnoi Khirurgi, Armenian SSR). *Kibernetika i Vychislitel'naia Tekhnika,* no. 25, 1974, p. 44, 45. In Russian.

A75-22986 # Evaluation of the functional state of the central nervous system according to results of a structural analysis of electroencephalograms by computer (Otsenka funktsional'nogo sostoianiia TsNs po rezul'tatam strukturnogo analiza elektroentsefalogramm na EVM). S. N. Zharovskii and L. S. Aleev (Akademiia Nauk Ukrainskoi SSR, Institut Kibernetiki, Kiev, Ukrainian SSR). *Kibernetika i Vychislitel'naia Tekhnika,* no. 25, 1974, p. 55-58. In Russian.

A75-22987 # An algorithm for automated processing of dilution curves (Ob odnom algoritme avtomatizirovannoi obrabotki krivykh razvedeniia). T. A. Volkhonskaia and A. G. Vasilega (Akademiia Nauk Ukrainskoi SSR, Institut Kibernetiki, Kiev, Ukrainian SSR). *Kibernetika i Vychislitel'naia Tekhnika,* no. 25, 1974, p. 59-63. In Russian.

An algorithm is proposed for automatically processing dye dilution curves used for determining the stroke volume of the heart. Such an automatic process would consist in feeding curve data to a computer, which determines the equation of the descending part of the dilution curve, computes the area below the extrapolated curve, and then computes the minute volume and other hemodynamic indices. An algorithm and block scheme for these computations are described. P.T.H.

A75-22988 # Criteria for optimizing the parameters of medical-biological data processing devices (Kriterii optimizatsii parametrov ustroistv obrabotki mediko-biologicheskoi informatsii). S. N. Zharovskii (Akademiia Nauk Ukrainskoi SSR, Institut Kibernetiki, Kiev, Ukrainian SSR). *Kibernetika i Vychislitel'naia Tekhnika,* no. 25, 1974, p. 67-71. 5 refs. In Russian.

Criteria are examined for determining the noise and frequency characteristics of data preprocessing devices used in the computer analysis of electrophysiological signals (EEG, ECG, etc.). Statistical analysis is carried out for determining the allowable error in the computation of the probability characteristics of a signal in the presence of noise. Allowable error is shown to depend mainly on the dispersion and degree of regularity of the given signals and is expressed in the error in computing the correlation function damping time. P.T.H.

A75-22989 # Device for preprocessing medical-biological data for digital computer (Ustroistvo pervichnoi podgotovki mediko-biologicheskoi informatsii dlia TsVM). L. S. Aleev, N. S. Zharovskii, and Sh. Iu. Iakupov (Akademiia Nauk Ukrainskoi SSR, Institut Kibernetiki, Kiev, Ukrainian SSR). *Kibernetika i Vychislitel'naia Tekhnika,* no. 25, 1974, p. 71-74. In Russian.

Operation, circuitry, and block diagram of a data preprocessing device are described, which performs the following functions: amplification of the electrophysiological signals, conversion into binary code, recording onto magnetic tape, data input into the computer, and signal decoding and reproduction in analog form for monitoring and possible processing by analog means. P.T.H.

A75-22990 # What is homeostasis of the brain (Chto takoe gomeostazis mozga). K. A. Ivanov-Muromskii (Akademiia Nauk Ukrainskoi SSR, Institut Kibernetiki, Kiev, Ukrainian SSR). *Kibernetika i Vychislitel'naia Tekhnika,* no. 25, 1974, p. 87-95. 81 refs. In Russian.

The general principles of the self-regulating mechanisms of brain systems are set forth. The self-regulating process of the brain is defined as an expression of the adaptive activity of the organism which is accomplished with the aid of direct and feedback links between central and peripheral apparatuses and is aimed at the maintenance of homeostasis. The concept of homeostasis, as extended to the activity of any subsystem of the organism, is defined as the reaction of a system to a deviation from a given result by means of changing the system parameters and by the passage of the system into a new field of action for attaining a more useful outcome as a result of a determinate and probabilistic-statistical search. P.T.H.

A75-23118 Ballistocardiographic methods and cardiovascular dynamics; Proceedings of the Third World and Ninth European Congress, Sofia, Bulgaria, April 16-18, 1973. Edited by A. A. Talakov (Meditsinska Akademiia, Sofia, Bulgaria). Basel, S. Karger AG (Bibliotheca Cardiologica, No. 33), 1975. 252 p. $50.75.

Experimental and theoretical results concerning different means of mostly noninvasive measurement of various aspects of cardiovascular performance are reported on, many of them employing ballistocardiography. This technique and the techniques of kinetocardiography and apex-cardiography are explained in application to the study of the cardiac cycle, ischemia, angina, coronary occlusion, high blood pressure, performance of the great arteries, and age-dependent characteristics of ballistocardiograms. The topics featured include: noninvasive measurement of haemodynamic phases of the right heart, ballistocardiography in sanatorial and health resort

rehabilitation of patients after myocardial infarction, age-dependent changes in the complex of impedance plethysmographic and hemodynamic indices of the lung and aorta, and semiautomatic-planimetric analysis of the Bcg (by means of an electrointegration set).

S.J.M.

A75-23119 Noninvasive measurement of haemodynamic phases of the right heart. L. Mihoczy and L. Voith. In: Ballistocardiographic methods and cardiovascular dynamics; Proceedings of the Third World and Ninth European Congress, Sofia, Bulgaria, April 16-18, 1973. Basel, S. Karger AG, 1975, p. 21-26. 5 refs.

The right apex cardiogram was used to measure the duration of the hemodynamic phases of the right heart. Fifty healthy persons were studied. Three phases could be distinguished on the normal right apex cardiograms. Pre-ejection period and right ventricular ejection time were measured. The investigations were checked by tests in dogs, where the relation between invasive and non-invasive curves was measured by means of comparative mechanograms. The data obtained are in accordance with invasive results in the literature.

S.J.M.

A75-23120 High-frequency /acceleration/ direct body ballistocardiography. N. J. Winer (Lenox Hill Hospital, New York, N.Y.). In: Ballistocardiographic methods and cardiovascular dynamics; Proceedings of the Third World and Ninth European Congress, Sofia, Bulgaria, April 16-18, 1973.
Basel, S. Karger AG, 1975, p. 37-43. 6 refs. Research supported by the Florence G. Heller Foundation and Xerox Corp.

A75-23121 Simulation of catecholamine action in an improved electrical model. M. Prepadnik and G. Juznic (Institute of Physiology, Ljubljana, Yugoslavia). In: Ballistocardiographic methods and cardiovascular dynamics; Proceedings of the Third World and Ninth European Congress, Sofia, Bulgaria, April 16-18, 1973. Basel, S. Karger AG, 1975, p. 44-65. 15 refs. Research supported by the Boris Kidric Fund.

An improved electrical model of circulation is described. It was necessary to improve the links in the systemic circulation, the work of the valves. Therefore the new system is filled with a definite amount of charge (corresponding to blood volume) which remains constant in the system and recirculates all the time the system is operating. In addition, the ventricles are represented as a changing capacity, the contractility of the heart can be varied, the valves are represented by relays, and the pulse wave velocity can be represented. Catecholamine action is studied by changing the heart rate, contractility, elastic resistance and peripheral resistance. The influence on systolic and diastolic pulse pressure and on flow pulses in different parts of the arterial system is measured. The importance of the concept of internal surface deformation capacity of the ventricles to the global understanding of the cardiovascular system is emphasized. S.J.M.

A75-23122 A new method of studying the cardiac cycle by means of mechanocardiograms. C. Ambrosi, G. Heuillet, and R. A. Soulier. In: Ballistocardiographic methods and cardiovascular dynamics; Proceedings of the Third World and Ninth European Congress, Sofia, Bulgaria, April 16-18, 1973.
Basel, S. Karger AG, 1975, p. 76-83.

A new technique of mechanogram study is presented which consists in combining two curves: the left apex cardiogram and the left carotidogram. A diagram similar to those obtained in mechanics is obtained. Curves of a normal subject and of subjects with various diseases are compared. Observation of two lines in the curves provides a quick diagnostic aid. The method also appears to furnish more complete information than classical mechanogram study. The apparatus gives the time and speed of the different events in the cardiac cycle. S.J.M.

A75-23123 Evaluation of cardiac pump performance and heart muscle mechanics from the apex cardiogram. Kh. Kaponov (Meditsinska Akademiia, Varna, Bulgaria). In: Ballistocardiographic methods and cardiovascular dynamics; Proceedings of the Third World and Ninth European Congress, Sofia, Bulgaria, April 16-18, 1973. Basel, S. Karger AG, 1975, p. 129-132.

A75-23124 Influence of carotid baroreceptors on vascular responses to carotid chemoreceptor stimulation in the dog. G. Mancia. *Circulation Research,* vol. 36, Feb. 1975, p. 270-276. 28 refs. Grants No. PHS-HL-5883; No. PHS-HL-6143.

A75-23200 * Thermoregulatory responses to preoptic cooling in unrestrained rabbits. G. N. McEwen, Jr. (Illinois, University, Urbana, Ill.; NASA, Ames Research Center, Environmental Control Research Board, Moffett Field, Calif.) and J. E. Heath (Illinois, University, Urbana, Ill.). *American Journal of Physiology,* vol. 227, Oct. 1974, p. 954-957. 9 refs.

Rabbits at ambient temperatures within the thermal neutral zone show two different metabolic responses to preoptic cooling. One response type is defined by a preoptic thermal sensitivity that shifts with ambient temperature and a 'set point' that remains constant. The other response type is defined by a set point that shifts with ambient temperature and a preoptic thermal sensitivity that remains constant. Both response types can be modeled by a single equation. Nonmetabolic thermoregulatory responses are not significantly different between the two response types. (Author)

A75-23302 Vestibular system. Part 1 - Basic mechanisms. Edited by H. H. Kornhuber (Ulm, Universität, Ulm, West Germany). Berlin, Springer-Verlag (Handbook of Sensory Physiology. Volume 6, pt. 1), 1974. 683 p. $97.60.

The comparative morphology and physiology, peripheral mechanisms, and central mechanisms of the vestibular system are described in light of recent experimental and theoretical studies. Topics dealt with include: the perception of gravity and of angular acceleration, the functional significance of semicircular canal size, the histochemistry and metabolism of the inner ear, the morphological aspects of the efferent vestibular system, the physiological aspects of the efferent vestibular system, the anatomy of the vestibular nuclei and their connections, the physiology of the vestibular nuclei, cerebello-vestibular interrelations, the vestibulo-ocular reflex arc, vestibulo-spinal mechanisms, cortical projections of the vestibular nerve, and vestibular influences during sleep.

Individual items are announced in this issue. S.J.M.

A75-23303 The perception of gravity and of angular acceleration in invertebrates. H. Markl (Konstanz, Universität, Konstanz, West Germany). In: Vestibular system. Part 1. Berlin, Springer-Verlag, 1974, p. 17-74. 263 refs.

A phylogenetic approach to the function of mechanoreceptors involved in posture control in lower forms, and to tonus-controlling effects of these organs as well to their role in vibration perception, is undertaken. The most common gravireceptor studied is the statocyst. A review of orientation mechanisms in all the invertebrate phyla reveals that there is no general evolutionary pattern, i.e., that gravireceptors have evolved independently in different groups. Orientation by light often replaces orientation by gravity. It is possible that posture control mechanisms evolved from organs which formerly acted as vibration receptors. S.J.M.

A75-23304 Comparative morphology and physiology. O. E. Lowenstein (Birmingham, University, Birmingham, England). In: Vestibular system. Part 1. Berlin, Springer-Verlag, 1974, p. 75-120. 116 refs.

The aural organs of various animals are comparatively examined with an eye to establishing clues to the emergence of the vertebrates during organic evolution. The labyrinth is followed from its subdivision into semicircular canals and otolith organs in the ostracoderms and cyclostomes through its morphological development in the mammals. The basic morphological characteristics of the

semicircular canals and otolith organs are generalized, the functions of the labyrinth are outlined, the role of the hair-cell in mechano-electric transduction is explained, the resting discharge is described, hair-cell mapping is discussed, different types of canal response to stimuli are elaborated upon, a mechanical analysis of the perturbation phenomena is provided, and various experimental processes are detailed. S.J.M.

A75-23305 Morphology of the vestibular sense organ. J. Wersall and D. Bagger-Sjoback (Huddinge Sjukhus, Huddinge, Sweden). In: Vestibular system. Part 1. Berlin, Springer-Verlag, 1974, p. 123-170. 78 refs. Swedish Medical Research Council Grant No. B71-12X-720-06-09.

A general description of the vertebrate labyrinth and its components is given. The gross structure of the membranous labyrinth is first illustrated by a comparison of cyclostomes and other lower vertebrates with certain higher vertebrates. The structure of the labyrinthine wall, the topographic organization of the sensory areas, the minute structure of the sensory epithelia, innervation of the labyrinth, and morphological polarization of the vestibular sensory areas are then described. S.J.M.

A75-23306 The functional significance of semicircular canal size. G. M. Jones (McGill University, Montreal, Canada). In: Vestibular system. Part 1. Berlin, Springer-Verlag, 1974, p. 171-184. 14 refs.

Some structural data on the semicircular canals is analyzed in view of the fact that there is very little change in their size with the size of the animal they are found in. A mathematical relation is derived concerning the radius of the endolymphatic canal and the radius of curvature of its thin section which fits the data quoted. It is hypothesized that the large viscous damping associated with the small size enables maintaining accurate angular velocity transduction despite changes in the likely range of head movements brought about by animal size, habitat, and mode of movement. S.J.M.

A75-23307 Histochemistry and metabolism of the inner ear. G. F. Dohlman. In: Vestibular system. Part 1. Berlin, Springer-Verlag, 1974, p. 185-212. 207 refs.

Localization and specific function of different enzymes at various sites in the inner ear are discussed. After a general biochemical introduction, results in several fields are reported. Information concerning succinic dehydrogenase, NAD and NADP, lactate dehydrogenase, the phosphorylases, pigment proteins, lipofuscin, acetylcholine, lipids, and carbohydrates is presented. The role of the mitochondria in these enzymatic reactions is emphasized. A method of visualizing adrenergic nerve fibers in the ear is described. The enzyme distribution in the cells of the membranous walls is not basically different from that of most other cells; but there are differences in the density of special organelles, particularly the mitochondria, where most of these enzymes are located. The hair cells have access to pentose shunt enzymes. The highest activity of respiratory enzymes is found in the dark cells. The dark cells maintain the electrolyte pattern essential to the normal functioning of the hair cells. S.J.M.

A75-23308 Morphological aspects of the efferent vestibular system. R. R. Gacek (Massachusetts Eye and Ear Infirmary, Boston, Mass.). In: Vestibular system. Part 1. Berlin, Springer-Verlag, 1974, p. 213-220. 24 refs.

A75-23309 Physiological aspects of the efferent vestibular system. W. Precht (Max-Planck-Institut für Hirnforschung, Frankfurt am Main, West Germany). In: Vestibular system. Part 1. Berlin, Springer-Verlag, 1974, p. 221-236. 49 refs.

A75-23310 Anatomy of the vestibular nuclei and their connections. A. Brodal (Oslo, Universitetet, Oslo, Norway). In: Vestibular system. Part 1. Berlin, Springer-Verlag, 1974, p. 239-352. 223 refs.

The current work gives a survey of present knowledge about the structural organization of the vestibular nuclear complex, including its efferent and afferent connections. Anatomical features of functional interest are emphasized. Principal features described include: a distinction can be made between a peripheral zone and a central region in the superior vestibular nucleus; the superior nucleus appears to be related to the oculomotor apparatus; a rostroventral and a dorsocaudal portion can be distinguished in the lateral vestibular nucleus; the lateral nucleus appears to be important as a station in pathways mediating cerebellar influences on the spinal cord; the medial vestibular nucleus is scarcely an entity from a functional point of view; the medial nucleus appears to be organized in a less specific manner than the superior and lateral nuclei; nerve connections indicate functional differences between certain regions of the descending vestibular nucleus; and the descending nucleus is similar to the medial, but it is not concerned with vestibular influences on the ocular muscles. S.J.M.

A75-23311 The physiology of the vestibular nuclei. W. Precht (Max-Planck-Institut für Hirnforschung, Frankfurt am Main, West Germany). In: Vestibular system. Part 1. Berlin, Springer-Verlag, 1974, p. 353-416. 309 refs.

With emphasis on recent microphysiological studies and techniques, the physiological features of the vestibular nuclei are presented and correlated with certain anatomical features of the nuclei. Labyrinthine input to the vestibular nuclei is discussed with respect to stimulation of the labyrinthine organs, field potentials in the vestibular nuclei produced by stimulation of the eighth nerve, input from the semicircular canals, input from the otolith organs, receptor convergence on central neurons, and labyrinthine influences on the contralateral vestibular nuclei. The vestibular nuclei are considered in relation to other systems, viz. the cerebellum, the reticular formation, the spinal cord, and the oculomotor system. S.J.M.

A75-23312 Cerebello-vestibular interrelations. O. Pompeiano (Pisa, Università, Pisa, Italy). In: Vestibular system. Part 1. Berlin, Springer-Verlag, 1974, p. 417-476. 368 refs.

The problem of the functional relations between the vestibular system and the cerebellum is discussed from the following points of view: (1) effects of the vestibular input on the cerebellum; (2) input-output relation of the vestibular volleys at the cerebellar level, and (3) effects of the cerebellar output on the vestibular nuclei and their related functions. Emphasis is on the cerebellar control of vestibular influences exerted on the oculomotor nuclei and on spinal motoneurons. Experiments reported demonstrate the existence of functional relationships between the vestibular system and the flocculonodular lobe and the corpus cerebelli. The evidence also indicates that the vestibular nuclei receive excitatory impulses through both the primary vestibular afferents and the fastigio-vestibular pathways but are under the inhibitory control of Purkinje neurons. S.J.M.

A75-23313 The vestibulo-ocular reflex arc. B. Cohen (Mount Sinai School of Medicine, New York, N.Y.). In: Vestibular system. Part 1. Berlin, Springer-Verlag, 1974, p. 477-540. 405 refs. Grant No. PHS-NS-00294.

Three topics related to vestibulo-ocular reflexes are considered: (1) the function of eye movements induced by the vestibulo-ocular reflex arc; (2) the pattern of eye movements induced by various parts of the vestibular apparatus; (3) the central pathways which carry activity responsible for these deviations. Important points made include: the vestibulo-ocular reflex arcs are the neural substrate which links the vestibular sensory receptors to the eye muscles; there are two potential pathways over which activity from the vestibular nuclei can reach the motor nuclei of eye muscles - one in the brainstem, the other in the cerebellum; beyond the vestibular nuclei there is some separation of pathways which mediate activity for

horizontal and vertical rotatory eye movements; cerebellar nuclear lesions produce paralysis of ipsilateral adduction, whereas mesencephalic reticular formation lesions have little effect on vestibulo-ocular reflexes; and eye movements in various spatial planes are induced by stimulation of regions of the cerebellum which appear to be partially separate from each other. S.J.M.

A75-23314 Vestibulo-spinal mechanisms. B. E. Gernandt. In: Vestibular system. Part 1. Berlin, Springer-Verlag, 1974, p. 541-564. 78 refs.

The present work concerns primarily vestibulo-spinal activity and the interaction at spinal levels among vestibular, segmental and intersegmental propriospinal, and pyramidal activities. In order to obtain short-lasting potential changes, electrical square wave pulses were applied to the peripheral vestibular axons equipped with stimulating electrodes, and these more or less predictable evoked potentials were used to map the central representation of the vestibular system. S.J.M.

A75-23315 Cortical projections of the vestibular nerve. J. M. Fredrickson, D. W. F. Schwarz (Toronto, University, Toronto, Canada), and H. H. Kornhuber (Ulm, Universität, Ulm, West Germany). In: Vestibular system. Part 1. Berlin, Springer-Verlag, 1974, p. 565-582. 81 refs.

Information concerning cortical representation of vestibular function is presented. These representations in thalamus and cerebral cortex show that labyrinthine messages join somatic proprioception. This is functionally significant, since both of them signal the position and movements of the body. The cortical vestibular representation is in the Rolandic sensorimotor area, not in the temporal lobe. It belongs to the first somatosensory area (SI). It serves conscious orientation in space and higher motor regulations of the limbs. It has nothing to do with eye movements. S.J.M.

A75-23316 Vestibular influences during sleep. O. Pompeiano (Pisa, Università, Pisa, Italy). In: Vestibular system. Part 1. (A75-23302 09-51) Berlin, Springer-Verlag, 1974, p. 583-622. 197 refs.

Results obtained in unrestrained, unanesthetized cats, with permanently implanted electrodes, bearing on vestibular activity and mechanisms involved during rapid eye movement (REM) periods of desynchronized (deep) sleep, are summarized. The analysis shows that the medial and descending vestibular nuclei represent the triggering mechanism responsible not only for the REM, but also for the phasic excitation of corticospinal and rubrospinal motoneurons. The phasic events are due to ascending vestibular volleys impinging upon the motor cortex. Parallel to the phasic excitation of extrinsic ocular and spinal motoneurons, phasic inhibitory events affect the transmission of sensory inputs along several sensory pathways. The result is that the animal is functionally deafferented during REM every time the oculomotor and spinal motoneurons are phasically excited. The conclusion can be drawn that the supraspinal descending inhibitory influences which cause presynaptic depolarization of the primary afferents to the spinal motoneurons during the bursts of REM originate from or are triggered by the medial and descending vestibular nuclei. REM vestibular activity can block transmission of somatic afferent volleys to the polysynaptic spinal reflex pathway not only directly, but through the sensorimotor cortex. S.J.M.

A75-23351 Biotelemetry II; Proceedings of the Second International Symposium, Davos, Switzerland, May 20-24, 1974. Edited by P. A. Neukomm (Eidgenössische Technische Hochschule, Zurich, Switzerland). Basel, S. Karger AG, 1974. 253 p. $23.50.

The major new developments in telemetric equipment and transducers, microtelemetry, implants, integrated technology, storage telemetry, preprocessing and reduction of telemetric data, telemetry of biomechanical parameters, telemetry of respiratory and cardiovascular parameters, telemetry of neurobiological parameters, patient monitoring and clinical telemetry, and long-distance telemetry and tracking are reported. Some of the topics discussed are: criteria and their measurements in multichannel biotelemetry, and ECG-transmitter system for good battery efficiency, telemetric measurement of intracranial pressure with the help of an electromagnetic detector, an integrated circuit implantable pulsed Doppler ultrasonic blood flowmeter, an electronic instrument for gastro-intestinal telestimulation, digital memorization of biological waveforms, experimental biotelemetry in alpine skiing, instrumentation for renal hemodynamic studies in unrestrained dogs, an eight-channel semi-implantable telemetry system for animal research, and instrumentation for studying social activity in mouse colonies. S.J.M.

A75-23352 Personal PDM/PCM biotelemetry system. H. P. Kimmich and H. J. B. Ijsenbrandt (Nijmegen, Katholieke Universiteit, Nijmegen, Netherlands). In: Biotelemetry II; Proceedings of the Second International Symposium, Davos, Switzerland, May 20-24, 1974. Basel, S. Karger AG, 1974, p. 2-4.

A biotelemetry method is described by which a simple conversion of pulse decode modulation (PDM) systems to pulse code modulation (PCM) systems is possible, giving all the well-known advantages of PCM, such as greater accuracy and direct compatibility to digital data processing at the receiving side. S.J.M.

A75-23353 Studies to compensate temperature effects in measurements of respiratory oxygen. G. Küchler, W. Wagner, R. Schneiderreit, and I. Wolburg (Deutsches Zentralinstitut für Arbeitsmedizin, Berlin, East Germany). In: Biotelemetry II; Proceedings of the Second International Symposium, Davos, Switzerland, May 20-24, 1974. Basel, S. Karger AG, 1974, p. 22-24.

The effect of changes in temperature on the output of the P-O2 (oxygen partial pressure)-sensitive receptor used in previous oxygen consumption measurements was investigated, and compensation of the temperature effect by using thermistors was tried. The thermistors were effective. Problems involved in compensation by this means are described. S.J.M.

A75-23354 Implantable integrated electronics. J. D. Meindl (Stanford University, Stanford, Calif.). In: Biotelemetry II; Proceedings of the Second International Symposium, Davos, Switzerland, May 20-24, 1974. Basel, S. Karger AG, 1974, p. 32-36.

Monolithic integrated circuits present an enormous opportunity for enhanced performance of implantable biomedical telemetry systems. These systems often require micropower operation at low supply voltages, a stringent limitation uncommon in monolithic design; they offer a constant temperature environment within the body, a unique and altogether unexploited asset. Charge coupled devices exhibiting analog memory and time delay promise profound new developments. (Author)

A75-23355 An integrated circuit implantable pulsed Doppler ultrasonic blood flowmeter. R. W. Gill and J. D. Meindl (Stanford University, Stanford, Calif.). In: Biotelemetry II; Proceedings of the Second International Symposium, Davos, Switzerland, May 20-24, 1974. Basel, S. Karger AG, 1974, p. 37-39. Grant No. PHS-1-P01-GM-17940-04.

A75-23356 * A multichannel implant telemetry system for cardiovascular flow, pressure and ECG measurement. T. B. Fryer, H. Sandler, and W. Freund (NASA, Ames Research Center, Moffett Field; Stanford University, Stanford, Calif.). In: Biotelemetry II; Proceedings of the Second International Symposium, Davos, Switzerland, May 20-24, 1974. Basel, S. Karger AG, 1974, p. 40-42.

A75-23357 PDM multichannel telemetry system for biological use. T. Furukawa, M. Ikeuchi, and G. Matsumoto (Hokkaido University; Mitsumi Electric Co., Ltd., Sapporo, Japan). In: Biotelemetry II; Proceedings of the Second International Symposium,

Davos, Switzerland, May 20-24, 1974. Basel, S. Karger AG, 1974, p. 52-54.

The present work describes a PDM/FM multichannel telemetry system which makes the reference channel in a biological measuring device unnecessary. In this system, the product of frame rate and pulse duration is kept nearly constant despite the fact that each term is sensitive to the ambient temperature and the supply voltage. This feature prolongs the battery life. Better performance of the system will be achieved by using hybrid integrated circuit technology. S.J.M.

A75-23358 Low level 'COS/MOS' multiplexing for simplified EEG telemetry. R. W. Vreeland and C. L. Yeager (California, University, San Francisco, Calif.). In: Biotelemetry II; Proceedings of the Second International Symposium, Davos, Switzerland, May 20-24, 1974. Basel, S. Karger AG, 1974, p. 55-57. Contract No. N00014-69-C-0200-2007.

Consolidation of the separate amplifiers used in conventional EEG telemetry has been accomplished by multiplexing with CD4016 'COS/MOS' gating switches. Each switch consists of an 'N' channel FET parallel with a 'P' channel FET. The required gating pulses are of opposite polarity. Consequently, the portions of the gating pulses that are doupled into the channel effectively cancel. The circuit for the monoamplifier system is described. S.J.M.

A75-23359 Digital memorization of biological waveforms. P. Pinösch, P. Friedli, and J. P. Rerat (Eidgenössische Technische Hochschule, Zurich, Switzerland). In: Biotelemetry II; Proceedings of the Second International Symposium, Davos, Switzerland, May 20-24, 1974. Basel, S. Karger AG, 1974, p. 74-76. 6 refs.

The first experiment in a project aiming at the construction of miniature digital memories for biological signals is described. Because of the restriction in memory capacity, some sort of data compression is necessary; in this experiment a special form of differential coding, called reduced delta code modulation (RDCM), proved to be advantageous. Body temperature and heart frequency of hens and body activity of free ranging deer were the objects of the study. S.J.M.

A75-23360 Combined telemetry of cardiovascular parameters in sports - Continuous measurements of direct aortic and pulmonary blood pressures. H. Fleischer, R. Zerzawy, and K. Bachmann (Erlangen-Nünberg, Universität, Erlangen, West Germany). In: Biotelemetry II; Proceedings of the Second International Symposium, Davos, Swtzerland, May 20-24, 1974. Basel, S. Karger AG, 1974, p. 137-139. Research supported by the Deutsche Forschungsgemeinschaft.

A75-23361 Instrumentation for renal hemodynamic studies in unrestrained dogs. R. D. Rader, C. M. Stevens, J. P. Meehan, and J. P. Henry (Southern California, University, Los Angeles, Calif.). In: Biotelemetry II; Proceedings of the Second International Symposium, Davos, Switzerland, May 20-24, 1974. Basel, S. Karger AG, 1974, p. 158-160. Grant No. AF-AFOSR-72-2190.

The use of a chronically implanted telemetry system that measures renal artery blood flow and abdominal aortic blood pressure in totally unrestrained animal subjects has made it possible to begin assessing the role that renal hemodynamics plays in the development of naturally occurring or experimentally induced hypertension. The carrier consists of a single stage LC oscillator occupying a volume of one cubic centimeter. The components of the new system have greater longevity than old components. S.J.M.

A75-23362 Monitoring neurobiological processes - Cable connections or telemetry. A. A. Borbely (Zürich, Universität, Zurich, Switzerland). In: Biotelemetry II; Proceedings of the Second International Symposium, Davos, Switzerland, May 20-24, 1974. Basel, S. Karger AG, 1974, p. 168-172. 21 refs. Swiss National Science Foundation Grant No. 3,212,73.

A discussion focusing some of the problems relevant to application of telemetric methods to neurobiological investigations is given. Experiments with small animals show that recent progress in miniaturization of electronic components and circuits has opened the possibility of using multichannel biotelemetry even in these animals. Cable connections may in some instances influence an animal's behavior and thus interfere with an experiment. Studies necessitating telemetry include experiments with animals in their natural environment or under extreme conditions. One should think twice, however, before using telemetric methods. S.J.M.

A75-23363 An eight channel semi-implantable telemetry system for animal research. D. E. Olsen, S. L. Moise, Jr., and S. W. Huston (California, University, Los Angeles, Calif.). In: Biotelemetry II; Proceedings of the Second International Symposium, Davos, Switzerland, May 20-24, 1974. Basel, S. Karger AG, 1974, p. 173-175. Grant No. PHS-GM-16058-08; Contract No. F44620-70-C-0017.

A75-23364 Experiences with a telemetric system permitting simultaneous EEG recordings and brain stimulation in cats. P. Polc and H. Wolfgang (F. Hoffman-La Roche and Co., Ltd., Basel, Switzerland). In: Biotelemetry II; Proceedings of the Second International Symposium, Davos, Switzerland, May 20-24, 1974. Basel, S. Karger AG, 1974, p. 176-178.

A75-23365 * A multichannel biotelemetry transmitter utilizing a PCM subcarrier. T. B. Fryer and R. M. Westbrook (NASA, Ames Research Center, Moffett Field, Calif.). In: Biotelemetry II; Proceedings of the Second International Symposium, Davos, Switzerland, May 20-24, 1974. Basel, S. Karger AG, 1974, p. 202-204.

Making use of the currently available integrated circuits, a miniature PCM telemetry system operating from one miniature 9-volt battery and drawing less than 5 milliamps has been constructed. The use of this PCM telemetry signal not only provides accurate data transmission, but requires a minimum of RF bandwidth. The serial format that results from multiplexing the input data allows the use of a single channel recorder with its cost savings over a multichannel tape recorder. An additional benefit of the PCM encoding is that the data is in digital format and is directly suitable for computer use. S.J.M.

A75-23400 # Perception of integral objects (Vospriiatie tselostnykh ob'ektov). V. A. Ganzen. Leningrad, Izdatel'stvo Leningradskogo Universiteta, 1974. 152 p. 110 refs. In Russian.

The problem of the perception of integral objects is examined on the basis of psychological data on the processes involved in human representation of the external world. Attention is directed mainly at the dependence of the process and result of perception on the properties of the perceived object. Various methods of describing integral objects are presented, a systematic analysis is made of the objects of aural and visual perception, and a detailed study is made of the roles, functions, and interactions of various levels of representation of integral objects. A.T.S.

A75-23497 Impact of avionic design characteristics on technical training requirements and job performance. K. W. Potempa, R. S. Luckew (USAF, Human Resources Laboratory, Wright-Patterson AFB, Ohio), and L. M. Lintz (McDonnell Douglas Astronautics Co., St. Louis, Mo.). *Human Factors*, vol. 17, Feb. 1975, p. 13-24. 9 refs. Contract No. F33615-71-C-1620.

This study was performed in two phases. The first phase concentrated on the influence of avionic design and technical training factors on student performance. The second phase dealt with the impact of design and personnel factors on the performance of technicians in operational Air Force units. Avionic components were scaled on a variety of design characteristics, and data were collected on the task time and error performance of students and technicians performing a functional checkout maintenance task on the components. Personnel data were also obtained on each subject. Multiple-

regression equations were then developed to predict task performance from design characteristics and personnel measures. The multiple R's for students were 0.90 for time and 0.82 for errors. The multiple R's for technicians ranged from 0.60 to 0.88, depending on the type of maintenance and criterion measure used; all R's were significant at the level of p less than 0.001. (Author)

A75-23498 The effect of local target surround and whole background constraint on visual search times. B. Brown and T. H. Monk (Nottingham University, Nottingham, England). *Human Factors,* vol. 17, Feb. 1975, p. 81-88. 22 refs. Science Research Council Grant No. B/SR/8627.

Two experiments are described in which the effect of nontargets in positions immediately adjacent to the target (target surround) on visual search times was examined under two background conditions. For both conditions, mean search times increased sigmoidally as a function of the number of nontargets in the target surround. Search times were longer for unconstrained than for constrained backgrounds (backgrounds in which some grouping was imposed on the elements of the background). A search strategy is suggested which would produce these results; further experiments are suggested to test the validity and generality of these concepts in visual search experiments. S.J.M.

A75-23499 # Relationships of fatigue and motion sickness to vestibulo-ocular responses to Coriolis stimulation. P. J. Dowd (USAF, School of Aerospace Medicine, Brooks AFB, Tex.), E. W. Moore (Personnel Assessment and Development Corp., San Antonio, Tex.), and R. L. Cramer. *Human Factors,* vol. 17, Feb. 1975, p. 98-105. 23 refs.

A Coriolis test on the USAFSAM biaxial stimulator was administered to 131 pilots. Two groups of pilots ('rested' and 'fatigued') were tested twice. Some of the pilots in each group got motion sickness during the initial test period. A two-parameter analog, measuring the rates of decay and sensitivity coefficients of vertical nystagmic responses, was used to compare the effects of fatigue and induced motion sickness on the nystagmic responses induced by Coriolis accelerations. Fatigue, in terms of moderate sleep deprivation of 24 to 30 hours, had significant deleterious effects on the vestibulo-ocular responses. Fatigue and induced motion sickness, simultaneously occurring, showed further deterioration of the vestibular system when compared with the nystagmic responses of rested and nonsick pilots. Such results indicate that fatigue and induced motion sickness make flying even more hazardous. (Author)

A75-23500 The interactions among stress, vigilance, and task complexity. R. S. Kennedy and X. B. Coulter (U.S. Naval Aerospace Medical Research Laboratory, Pensacola, Fla.). *Human Factors,* vol. 17, Feb. 1975, p. 106-109. 10 refs.

A simple (one-channel) or a complex (three-channel) vigilance task was administered with or without threat of shock to a large group of flight students. It was found that a larger absolute decrement was obtained in the complex task, but the relative decrements were equivalent for both. One-channel monitoring was better overall than three-channel monitoring in the nonstressed condition. Stressed subjects performed better than nonstressed, and this enhancement was greater for three-channel monitoring. (Author)

A75-23542 Biological effect of superhard component of cosmic rays. I. G. Akoev, S. S. Iurov, G. A. Leont'eva, I. A. Livanova, and A. Kh. Akhmadieva. *(Kosmicheskie Issledovaniia,* vol. 12, July-Aug. 1974, p. 617-624.) *Cosmic Research,* vol. 12, no. 4, Jan. 1975, p. 562-567. 37 refs. Translation.

Secondary emission generated at a target by 70 GeV protons, and consisting primarily of hadrons, was used in a model study of the biological effect of the ultrahard component. A high biological effectiveness is revealed and is attributed to the multiplicity of secondary-particle production, the narrow angular distribution of the secondary particles, and the probability of multiply charged ion production. V.P.

A75-23595 Acute subendocardial myocardial infarction in patients - Its detection by technetium 99-m stannous pyrophosphate myocardial scintigrams. J. T. Willerson, F. J. Bonte, E. M. Stokely (Texas, University, Parkland Memorial Hospital, Dallas, Tex.), R. W. Parkey, and S. L. Meyer. *Circulation,* vol. 51, Mar. 1975, p. 436-441. 13 refs. Research supported by the Southwestern Medical Foundation and Harry S. Moss Heart Fund; Grants No. NIH-HL-13625; No. NIH-N-30010; No. NIH-HL-15522; No. NIH-HL-06292.

A75-23596 The omnicardiogram - Study of a proposed method for detecting coronary heart disease in an asymptomatic population. C. P. Nay, W. B. Kannel, W. P. Castelli, and P. M. McNamara (Massachusetts Mutual Life Insurance Co., Springfield; Department of Health, Education and Welfare, Framingham, Mass.). *Circulation,* vol. 51, Mar. 1975, p. 462-466. 11 refs.

A proprietary, commercial technique has been proposed by its inventor as a noninvasive method of detecting subtle electrocardiogram abnormalities, not apparent by conventional means. To study the ability of the omnicardiogram to detect latent coronary heart disease in an asymptomatic population, 200 normal electrocardiograms from the Framingham Study cohort were analyzed by this technique. One-half of these consisted of the last normal electrocardiogram prior to development of clinical coronary heart disease. The omnicardiogram showed a higher degree of sensitivity than did the electrocardiogram to coronary heart disease, indicating an increased risk of myocardial infarction in this group. The low specificity of this technique as indicated by the large percentage of false positives shows that the omnicardiogram is not diagnostic of coronary heart disease in asymptomatic persons with normal electrocardiograms. (Author)

A75-23597 Vectorcardiographic diagnosis and electrocardiographic correlation in left ventricular asynergy due to coronary artery disease. I - Severe asynergy of the anterior and apical segments. E. Young, P. F. Cohn, R. Gorlin, H. D. Levine, and M. V. Herman (Peter Bent, Brigham Hospital; Harvard University, Boston, Mass.). *Circulation,* vol. 51, Mar. 1975, p. 467-476. 17 refs. Research supported by the Women's Aid for Heart Research; Grant No. PHS-5-PO1-HL-11306.

A75-23598 # A clinical and follow-up study of right and left bundle branch block. M. Rotman and J. H. Triebwasser (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Circulation,* vol. 51, Mar. 1975, p. 477-484. 36 refs.

Initial and follow-up information concerning a large group of asymptotic patients with bundle branch block (BBB) is reviewed. The subjects were divided into subgroups based on electrocardiographic (ECG) findings to determine if any one subgroup was at higher risk for initial or follow-up morbidity of cardiovascular disease or follow-up mortality. No differences in follow-up morbidity or mortality were observed in contrasting the individual ECG subgroups. Thus the prognosis of BBB is determined by the presence or absence, and degree, of associated cardiovascular disease. Furthermore, significant progressive electrical dysfunction is a rare occurrence. Some of the etiologic factors involved in subjects with BBB and no clinically apparent cardiovascular disease are discussed. S.J.M.

A75-23599 On the clinical value of calibrated displacement apexcardiography. B. Denef (Leuven, Katholieke Universiteit; Academic Hospital St. Raphael, Louvain, Belgium), R. Popeye, H. De Geest, and H. Kesteloot (Leuven, Katholieke Universiteit, Louvain, Belgium). *Circulation,* vol. 51, Mar. 1975, p. 541-551. 27 refs.

Experiments utilizing a new type of displacement transducer for recording the calibrated left apex-cardiogram (QLAC) are described. The study evaluates the clinical usefulness and limitations of the QLAC, its first derivative, and the normalized first derivative in the assessment of left ventricular function. It is concluded that the normalized first derivative of the QLAC provides useful information on that function. S.J.M.

A75-23640 * The effects of argon in the bioenergetics of the hamster and the rat. G. E. Tempel and X. J. Musacchia (Missouri, University, Columbia, Mo.). *Society for Experimental Biology and Medicine, Proceedings,* vol. 145, 1974, p. 704-709. 21 refs. Research supported by the University of Missouri; Grant No. NGL-26-004-021.

Oxygen consumption was examined in hamsters and rats exposed to normoxic mixtures of argon at 1 atm. In fasted and nonfasted animals, no marked change in O2 utilization was detectable at 22 C. However, at 7 C a significant decrease in oxygen consumption was observed where the animals were exposed in argon. The data are interpreted in terms of the greater thermal conductivity of nitrogen. The study was prompted by conflicting reports on the metabolic effects of argon and helium. S.J.M.

A75-23838 * Microbial metabolism and dynamic changes in the electrical conductivity of soil solutions - A method for detecting extraterrestrial life. M. P. Silverman and E. F. Munoz (NASA, Ames Research Center, Planetary Biology Div., Moffett Field, Calif.). *Applied Microbiology,* vol. 28, Dec. 1974, p. 960-967. 16 refs.

Experiments are reported which show that measuring metabolic activity in soil solutions by means of dynamic changes in electrical conductivity, water-soluble Ca, or water-soluble Mg is a feasible life detection method. The addition of 0.5% glucose solutions to 12 different air-dried soils always resulted in increases in all three of these parameters. The kinetics and magnitude of these changes for at least two and usually all three of the parameters over a 14-day period were clearly distinguishable from the changes in heat-sterilized controls or unsterilized controls without added glucose. In general, maximal values were achieved more rapidly under aerobic than under anaerobic incubation. S.J.M.

A75-23919 * Experientally guided robots. E. W. Merriam and J. D. Becker (Bolt Beranek and Newman, Inc., Cambridge, Mass.). In: International Telemetering Conference, Los Angeles, Calif., October 15-17, 1974, Proceedings.
Pittsburgh, Pa., Instrument Society of America, 1974, p. 580-586. Contracts No. NASw-2236; No. NASw-2572.

This paper argues that an experientally guided robot is necessary to successfully explore far-away planets. Such a robot is characterized as having sense organs which receive sensory information from its environment and motor systems which allow it to interact with that environment. The sensori-motor information which it receives is organized into an experiential knowledge structure and this knowledge in turn is used to guide the robot's future actions. A summary is presented of a problem solving system which is being used as a test bed for developing such a robot. The robot currently engages in the behaviors of visual tracking, focusing down, and looking around in a simulated Martian landscape. Finally, some unsolved problems are outlined whose solutions are necessary before an experientally guided robot can be produced. These problems center around organizing the motivational and memory structure of the robot and understanding its high-level control mechanisms.
(Author)

A75-23990 Eye movements, vision, and behavior. K. R. Gaarder (Texas, University; Audie L. Murphy Memorial Veterans Administration Hospital, San Antonio, Tex.). Research supported by the U.S. Public Health Service; Grant No. PHS-MH-06554-01. Washington, D.C., Hemisphere Publishing Corp., 1975. 166 p. 158 refs.

A new model of visual information processing is described which emerges from a thorough consideration of the role of eye movements in perception. Visual information processing is shown to be a discontinuous, feedback-mediated, hierarchically organized process structured by jumping eye movements. Emphasis is on simplification where possible. Wider implications of the new model are explored, including its significance in general cognitive processing. The book is intended both as a monograph in the field of eye movements and vision, and as a textbook suitable for supplemental assignments in courses on physiological psychology, vision, and biological information processing. It is organized to build, on a fundamental level, from one concept to the next. S.J.M.

A75-24056 Influence of muscular exercise on variations in plasma cortisol and glucose in man (Influence de l'exercice musculaire sur l'évolution de la cortisolémie et de la glycémie chez l'homme). M. Follenius and G. Brandenberger (CNRS, Centre d'Etudes Bioclimatiques, Strasbourg, France). *European Journal of Applied Physiology,* vol. 33, no. 1, 1974, p. 23-33. 35 refs. In French.

A75-24057 Heart and respiratory rates as indicators of a subject's adaptation to stimulus sequence in simple goal-directed tasks (Atem- und Herzfrequenz als Indicatoren einer Anpassung der Versuchspersonen an die Taktfolge bei einfachen Zielbewegungen). K. Scheuch, E. Münzberger, G. Schreinicke, and N. Roth (Leipzig, Universität, Leipzig, East Germany). *European Journal of Applied Physiology,* vol. 33, no. 1, 1974, p. 41-55. 34 refs. In German.

A75-24058 Variation of the sympatico-adrenal response to exercise during physical training in the rat (Evolution de la réponse adrénosympathique à l'exercice au cours de l'entraînement chez le rat). F. Bernet and J. Denimal (Lille I, Université, Villeneuve d'Ascq, Nord, France). *European Journal of Applied Physiology,* vol. 33, no. 1, 1974, p. 57-70. 26 refs. In French. Délégation Générale à la Recherche Scientifique et Technique Contract No. 70,02,291.

A75-24059 A new approach for the assessment of endurance work. J. Sen Gupta, S. S. Verma, N. T. Joseph, and N. C. Majumdar (Defence Institute of Physiology and Allied Sciences, New Delhi, India). *European Journal of Applied Physiology,* vol. 33, no. 1, 1974, p. 83-94. 45 refs.

Analysis of heart rate and dyspnea observations on bicycle ergometer-tested subjects has revealed that endurance time is hyperbolically related to both exercise dyspnea above its resting value and exercise heart rate above the resting value expressed as a percentage of the individuals' maximum value. It has been conclusively established that a combined index of cardiorespiratory strains during maximal or near-maximal efforts is superior to any single stress index as commonly employed, and hence a nomogram has been suggested whereby the endurance time can be readily and reliably predicted from observed values of exercise dyspnea and heart rate (as a percentage of HRmax). S.J.M.

A75-24071 # Phase relationships of alpha rhythm in man. H. Suzuki (Tokyo University of Education, Tokyo, Japan). *Japanese Journal of Physiology,* vol. 24, Dec. 1974, p. 569-586. 55 refs. Research supported by the Ministry of Health and Welfare of Japan.

Stationary phase relationships of human scalp EEGs in the frequency range of the alpha rhythm were examined by the method of cross-spectral analysis. With respect to inter-regional relationships in the antero-posterior direction, the alpha rhythms were classified into at least two types, one closely related to the visual function and the other depending upon some functions other than visual. The effectiveness of the cross-spectral analysis on phase relations of the EEG is discussed in comparison to other methods. S.J.M.

A75-24072 # Correlations between P wave terminal force and hemodynamic parameters in aortic stenosis - Prediction of left ventricular end-diastolic pressure. K. Forfang and S. Simonsen (Rikshospitalet, Oslo, Norway). *Cardiology,* vol. 59, no. 4, 1974, p. 222-230. 20 refs.

A75-24141 # **The life support system of Spacelab (Das Lebenserhaltungssystem beim Spacelab).** H. Eckert (Dornier-System GmbH, Friedrichshafen, West Germany). *Deutsche Gesellschaft für Luft- und Raumfahrt, Jahrestagung, 7th, Kiel, West Germany, Sept. 17-19, 1974, Paper 74-87.* 28 p. In German.

Life support systems in previous spacecraft are considered, giving attention to Mercury, Gemini, Apollo, the Lunar Module, and Skylab. The characteristics of the life support systems of the new generation for Spacelab-Space Shuttle/Orbiter are markedly different from the earlier systems. These differences are related to the requirement that the new systems are to be repeatedly used up to 50 times within a time period of up to 10 years. The systems for Spacelab and Orbiter will be continuously connected with each other and must, therefore, have a high degree of compatibility. The design requirements for the Spacelab life support system are discussed along with the atmosphere storage and control section and the atmosphere revitalization section. Questions of system integration are examined and aspects of system adaptability are considered. G.R.

A75-24355 * **Evaluation of particulate contamination for unmanned spacecraft prelaunch operations.** H. W. Schneider (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.). *Journal of Environmental Sciences,* vol. 18, Jan.-Feb. 1975, p. 20, 29-36. Contract No. NAS7-100.

The effectiveness of a contamination control approach taken during final assembly and simulated prelaunch operations with a Mariner Mars 1969 spacecraft at the Air Force Eastern Test Range is evaluated. It is concluded that the high bay operations during final encapsulation were the most critical and the largest contributor to spacecraft particulate contamination for the sequence of prelaunch operations considered. The mechanical generation of particulate matter from surfaces that were subject to wear and tear is identified as the primary source. S.J.M.

A75-24361 **Recovery from adaptation as a function of stimulus orientation.** C. S. Furchner and S. J. Young (Colorado, University, Boulder, Colo.). *Perception and Psychophysics,* vol. 17, Feb. 1975, p. 117-124. 27 refs.

These experiments examined the oblique effect in an adaptation paradigm. Reaction times (RT) to the presence of a grating test stimulus were obtained following adaptation to either a blank field or a grating of the same orientation as the test stimulus. Horizontal, vertical, and oblique test and adaptation orientations were employed. Test gratings were presented at several interstimulus intervals following offset of the adaptation stimulus. RTs following grating adaptation were elevated to a greater extent (relative to blank adaptation) for oblique then for horizontal or vertical stimuli, for two grating spatial frequencies. Differences in RT can be related to differences in sensitivity among channels responsible for detection of the various orientations. (Author)

A75-24362 **Depth adjacency and the Ponzo illusion.** W. C. Gogel (California, University, Santa Barbara, Calif.). *Perception and Psychophysics,* vol. 17, Feb. 1975, p. 125-132. 10 refs. Grant No. PHS-MH-15651.

The effect of depth displacement of test bars from the induction wedge of the Ponzo illusion was investigated in two experiments. Either two wedges of opposite orientation were presented simultaneously, one at a near and the other at a far distance, or only one wedge was presented at either the near or the far distance. The test bars were stereoscopically either in the plane of the wedge or displaced from the wedge in distance. When the two wedges were presented simultaneously, the direction of the Ponzo illusion was determined by the wedge at the same perceived distance as the test bars. When only one wedge was present, stereoscopic displacement of the bars in front of, but not behind, the wedge decreased the magnitude of the illusion. The results are interpreted in terms of the adjacency principle. (Author)

A75-24363 **Spatial localization of warmth.** R. H. Taus, J. C. Stevens, and L. E. Marks (John B. Pierce Foundation Laboratory; Yale University, New Haven, Conn.). *Perception and Psychophysics,* vol. 17, Feb. 1975, p. 194-196. 10 refs. Grant No. PHS-ES-00354.

This study explored the ability to localize warmth sensations produced by radiant stimulation of the forearm. The subject's task was to state on which side of a tactile reference line warmth was perceived. Percentage correct improved with increasing intensity of the radiation, as well as with increasing distance from the reference line. There appears to be an inverse relation between the ability to make spatial judgments and the degree of spatial summation. At low levels of stimulation, intensity and area both contribute heavily to the magnitude of a warmth sensation and spatial localization is poor; but with increasing level, area contributes less and less to sensation and localization is better. (Author)

A75-24364 **Decay of visual adaptation to tilt and displacement.** G. M. Redding (Illinois State University, Normal, Ill.). *Perception and Psychophysics,* vol. 17, Feb. 1975, p. 203-208. 17 refs. Grant No. PHS-MH-24420-01.

Persistence in the dark following 48 min of visual adaptation to tilt and displacement was compared in two experiments to determine if same or different processes are involved in the two kinds of adaptation. Decay of tilt adaptation occurred rapidly, all within about 16 min. However, it was not complete and some residual tilt adaptation persisted for at least as long as 56 min. Decay of displacement adaptation occurred more slowly but was clearly complete after at most 56 min in the dark. Displacement adaptation appears to be entirely subject to decay, while tilt adaptation involves an additional, more long-term component. Results are interpreted in terms of independent systems for the perception of location and orientation. (Author)

A75-24446 **Photopic spectral sensitivity of the peripheral retina.** B. R. Wooten (Brown University, Providence, R.I.), K. Fuld (Dartmouth College, Hanover, N.H.), and L. Spillmann (Freiburg, Universität, Freiburg im Breisgau, West Germany). *Optical Society of America, Journal,* vol. 65, Mar. 1975, p. 334-342. 20 refs. Research supported by the Deutsche Forschungsgemeinschaft.

Photopic spectral sensitivity was measured by two methods. The first method consisted of measuring increment thresholds on a background similar in spectral composition to CIE Source A. The resulting spectral-sensitivity functions had maxima near 440 nm, in agreement with Weale (1953). The second method involved estimating photopic thresholds from the cone plateau of the dark-adaptation curve. Then, the spectral sensitivity function has peaks near 550 nm and has a similar shape from the parafovea to the far periphery. It is suggested that Weale's (1953) finding of maximum photopic sensitivity in the short-wave region resulted from chromatic adaptation induced by backgrounds that were weighted toward middle and long waves. A.T.S.

A75-24447 **Visibility of low-spatial-frequency sine-wave targets - Dependence on number of cycles.** R. L. Savoy and J. J. McCann (Polaroid Vision Research Laboratory, Cambridge, Mass.). *Optical Society of America, Journal,* vol. 65, Mar. 1975, p. 343-350. 11 refs.

Experimental investigations show that the number of cycles determines the threshold contrast for low-frequency sinusoidal displays containing up to about three cycles. For targets with a high number of cycles and spatial frequencies above 6-10 cycles per degree, visibility is predominantly dependent on the spatial frequency. The shape of the display, the luminance of the surround, and the observer task can be varied without changing the importance of the number of cycles. The low-frequency decrease in reported modulation transfer functions (MTFs) is found to be due to the decrease in the number of cycles used in determining them. A.T.S.

A75-24495 **The receptor cells of hearing (Les cellules réceptrices de l'audition).** C. Cavé. *La Recherche,* vol. 6, Mar. 1975, p. 272, 273. 5 refs. In French.

Basic concepts of auditory transduction are briefly reviewed, and the recent work of Mulroy et al on the basilar papilla in lizards is reviewed. Two types of polarizing response were detected by microelectrode: one found by micropipette histology to correspond to the ciliary cells projecting into the lumen of the vestibule, the other similarly matched to the supportive cells of the basilar membrane. These latter cells, which had been assumed to have only structural functions, were thus proven to serve a precise sensory role. S.J.M.

A75-24593 **Psychophysical theories of duration discrimination.** L. G. Allan and A. B. Kristofferson (McMaster University, Hamilton, Ontario, Canada). *Perception and Psychophysics,* vol. 16, Aug. 1974, p. 26-34. 49 refs. National Research Council of Canada Grants No. A-8260; No. A-7919.

There are few quantitative theories of duration discrimination and few established empirical phenomena to guide theorizing. This paper discusses three such theories and several empirical findings. The theories assume that the discrimination is based only upon information extracted from the temporal extent of the stimulus pattern, and experimental evidence is presented that clearly supports this assumption for many stimulus patterns. Recent findings which indicate that duration information is analyzed in certain ways that are fundamentally different from other stimulus dimensions are reviewed, the duration discrimination psychometric function is examined, and the time-order error is discussed. The three theories are compared in terms of their ability to incorporate the empirical data. (Author)

A75-24594 **The effect of perceived distance on perceived movement.** W. C. Gogel and J. Tietz (California, University, Santa Barbara, Calif.). *Perception and Psychophysics,* vol. 16, Aug. 1974, p. 70-78. 14 refs. Grants No. NIH-NS-08883; No. PHS-MH-15651.

Equations developed to predict the apparent motion of a physically stationary object resulting from head movement as a function of errors in the perceived distances of the object or of its parts are presented, and results of experiments testing those equations are discussed. Results indicate a tendency for apparent relative motion to dominate apparent common motion when both are present simultaneously. It was also found that apparent rotations in predicted direction of a physically frontoparallel object occurred as a result of head motion, even though under the conditions used no rotary motion was present on the retina. S.J.M.

A75-24595 **Perceived size and perceived distance in stereoscopic vision and an analysis of their causal relations.** T. Oyama (Chiba University, Chiba, Japan). *Perception and Psychophysics,* vol. 16, Aug. 1974, p. 175-181. 31 refs.

A75-24596 **Movement parallax during locomotion.** E. S. Eriksson (Uppsala, Universitet, Uppsala, Sweden). *Perception and Psychophysics,* vol. 16, Aug. 1974, p. 197-200. 6 refs.

A hypothesis concerning the nature of movement parallax during locomotion is presented. According to the hypothesis, movement parallax constitutes a basic perceptual-motor mechanism able to produce veridical information as to spatial relations in three-dimensional space. Two experiments are reported verifying the hypothesis in that information due to movement parallax unequivocally dominated both the effects of proximal relative size and spatial anisotropy. (Author)

A75-24648 # **Some theorems and principles of biostatics as a methodological basis for choosing a computational scheme for biostructures (Nekotorye polozheniia i printsipy biostatiki, kak metodologicheskaia osnova vybora raschetnoi skhemy biosooruzhenii).** M. I. Petrichenko (Proektno-Konstruktorskoe Biuro Upravleniia Bytovogo Obsluzhivaniia, USSR). *Soprotivlenie Materialov i Teoriia Sooruzhenii,* no. 22, 1974, p. 161-171. 24 refs. In Russian.

A75-24746 * **Cardiovascular model for the simulation of exercise, lower body negative pressure, and tilt experiments.** R. C. Croston and D. G. Fitzjerrell (General Electric Co., Space Div., Houston, Tex.). In: Modeling and simulation. Volume 5 - Proceedings of the Fifth Annual Pittsburgh Conference, Pittsburgh, Pa., April 24-26, 1974. Part 1. Pittsburgh, Pa., Instrument Society of America, 1974, p. 471-476. 12 refs. Contract No. NAS9-12932.

A mathematical model and digital computer simulation of the human cardiovascular system and its controls have been developed to simulate pulsatile dynamic responses to the cardiovascular experiments of the Skylab missions and to selected physiological stresses of manned space flight. Specific model simulations of the bicycle ergometry, lower body negative pressure, and tilt experiments have been developed and verified for 1-g response by comparison with available experimental data. The zero-g simulations of two Skylab experiments are discussed. (Author)

A75-24747 * **Long-term regulation in the cardiovascular system - Cornerstone in the development of a composite physiological model.** R. J. White (Mississippi, University, Jackson, Miss.). In: Modeling and simulation. Volume 5 - Proceedings of the Fifth Annual Pittsburgh Conference, Pittsburgh, Pa., April 24-26, 1974. Part 1. Pittsburgh, Pa., Instrument Society of America, 1974, p. 477-482. 17 refs. Contract No. NAS9-12932.

The present work discusses a model of the cardiovascular system and related subsystems capable of long-term simulations of the type desired for in-space hypogravic human physiological performance prediction. The discussion centers around the model of Guyton and modifications of it. In order to draw attention to the fluid handling capabilities of the model, one of several transfusion simulations performed is presented, namely, the isotonic saline transfusion simulation. S.J.M.

A75-24748 **Evaluation of simulation capabilities with a respiratory-circulatory system integration scheme.** R. R. Gallagher (Kansas State University of Agriculture and Applied Science, Manhattan, Kan.). In: Modeling and simulation. Volume 5 - Proceedings of the Fifth Annual Pittsburgh Conference, Pittsburgh, Pa., April 24-26, 1974. Part 1. Pittsburgh, Pa., Instrument Society of America, 1974, p. 483-487. 6 refs. Research supported by the General Electric Co.

An integration scheme for combining models of the respiratory and circulatory systems is presented. The interface provides for a minimum amount of alteration of the two individual subsystems. Significant interfacing components include cardiac output, O2 metabolic requirements, blood oxygen capacity, and arterial hemoglobin concentration. Simulations are evaluated for both stressed and nonstressed circulatory system conditions with exercise being the major stimulus. (Author)

A75-24749 * **Computer and display systems for large physiological models.** R. F. Hassell (General Electric Co., Space Div., Houston, Tex.). In: Modeling and simulation. Volume 5 - Proceedings of the Fifth Annual Pittsburgh Conference, Pittsburgh, Pa., April 24-26, 1974. Part 1. Pittsburgh, Pa., Instrument Society of America, 1974, p. 489-493. Contract No. NAS9-12932.

This paper describes the computer and display systems which were developed for physiological models at NASA's Environmental Physiology Lab, Johnson Space Center. The systems involve hardware and software for remote communications, computation, and display. Also described is the development of a capability to proceed from a physiologist's hypothesis to meaningful presentations of model and laboratory data. Two large hardware and software computer configurations and their graphic display systems are discussed. One system is for dedicated use in the laboratory, and the other system is for remote use on a time-sharing basis. It is concluded

that these techniques can add a new dimension to physiological data analysis tasks. (Author)

A75-24797 * **Intestinal transport of tryptophan and its analogs.** T. R. Bosin, D. R. Hathaway, and R. P. Maickel (Indiana University, Bloomington, Ind.). *American Journal of Physiology,* vol. 228, Feb. 1975, p. 496-500. 25 refs. Grants No. PHS-NS-09672; No. PHS-MH-18852; No. NGL-15-003-117.

A75-24798 * **Renal function in the hibernating, and hypothermic hamster Mesocricetus auratus.** G. E. Tempel and X. J. Musacchia (Missouri, University, Columbia, Mo.). *American Journal of Physiology,* vol. 228, Feb. 1975, p. 602-607. 26 refs. Research supported by the University of Missouri; Grant No. NGL-26-004-021.

A75-24814 * **Three months in space.** W. R. Pogue (USAF, Washington, D.C.; NASA, Johnson Space Center, Houston, Tex.). *(Society of Experimental Test Pilots, Symposium, 18th, Beverly Hills, Calif., Sept. 25-28, 1974.) Society of Experimental Test Pilots, Technical Review,* vol. 12, no. 2, 1974, p. 203-217.

The third Skylab mission lasted from Nov. 16, 1973 until Feb. 8, 1974. The human and subjective aspects of long-term space flight are emphasized. Physiological questions are considered, taking into account the adaptation to zero-G and biological factors. Psychological problems are also investigated, giving attention to adaptation and adjustment, aspects of rest and recreation, and subjective factors and trivia. Working in zero-G was related to interior activities, observations regarding work station design, and extravehicular activity. A description is given of the various on-orbit operations on Skylab. G.R.

A75-24917 * **Finite element analysis of a human aortic valve.** P. L. Gould, A. Cataloglu, and R. E. Clark (Washington University, St. Louis, Mo.). In: International Symposium on Discrete Methods in Engineering, Segrate, Milan, Italy, September 19, 20, 1974, Proceedings. Milan, Etas Libri S.p.A., 1974, p. 501-511. 9 refs. Grants No. PHS-HL-13803; No. PHS-RR-05389; Contract No. NAS9-12459.

A75-25020 # **The factor of structural integration in brain activity (Faktor strukturnoi integratsii v deiatel'nosti mozga).** N. Iu. Belenkov (I Leningradskii Meditsinskii Institut, Leningrad, USSR). *Uspekhi Fiziologicheskikh Nauk,* vol. 6, Jan.-Mar. 1975, p. 3-18. 28 refs. In Russian.

Investigations of brain activity by means of reversible functional exclusion of separate regions in the cerebral cortex as well as through extirpation of certain cerebral regions show that acquisition of new habits and their execution are performed by the whole brain or at least by the cortex in conjunction with the subcortical structures. The effects of inclusion and exclusion of cerebral structures on the behavioral acts of animals are discussed. Formation of behavioral acts appears to be governed primarily by the principle of distribution of the functions of the individual nerve cells and structures over the entire system of cerebral elements, and to a lesser degree by the morphological connections between them. Results obtained by other investigators as regards the holographic principle of interpreting the brain activity are examined. S.D.

A75-25021 # **The effect of interoceptive stimulation on the bioelectric activity of skeletal muscles (Vliianie interotseptivnykh razdrazhenii na bioelektricheskuiu aktivnost' skeletnykh myshts).** Iu. M. Ufliand (Sanitarno-Gigienicheskii Meditsinskii Institut, Leningrad, USSR). *Uspekhi Fiziologicheskikh Nauk,* vol. 6, Jan.-Mar. 1975, p. 19-31. 30 refs. In Russian.

The reflex effects of stimulating interoceptors (with stimuli of various kinds) on the bioelectric activity of skeletal muscles are evaluated experimentally using electromyography. Particular attention is given to the effects of stimulating the chemoreceptors of the glomus caroticum and the mechanoreceptors of the gastrointestinal tract. The mechanism by which interceptors act on the adaptive properties of a reflex arc is identified. Interoceptive stimulation is shown to have a lesser influence than exteroceptive stimulation, and it has most often an inhibiting effect on the bioelectric potentials in muscles. Interoceptive stimulation is observed to play a major part in tonus regulation, and its stimulating or inhibiting effect on muscles is found to depend on the nature and location of the interoceptors, as well as on the condition of motor centers which is exhibited on the electromyogram. S.D.

A75-25022 # **Mechanism of the effect of noradrenalin and adrenalin on smooth muscle cells of sanguiferous vessels (Mekhanizm deistviia noradrenalina i adrenalina na gladkomyshechnye kletki krovenosnykh sosudov).** V. M. Taranenko (Akademiia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Uspekhi Fiziologicheskikh Nauk,* vol. 6, Jan.-Mar. 1975, p. 32-48. 172 refs. In Russian.

A75-25023 # **Use of deuterium in the investigation of water metabolism in living organisms (Ispol'zovanie deiteriia v issledovanii vodnogo obmena zhivykh organizmov).** Iu. B. Popov (Ministerstvo Zdravookhraneniia SSSR, Meditsinskii Institut, Khabarovsk, USSR). *Uspekhi Fiziologicheskikh Nauk,* vol. 6, Jan.-Mar. 1975, p. 85-99. 177 refs. In Russian.

The progress achieved through the application of deuterium oxide to the investigation of the water metabolism in living organisms is reviewed on the basis of an extensive survey of foreign literature. Deuterium oxide isotope is used to label water molecules for studying both extracellular and intracellular water metabolism, since the movement and path of water in an organism can be detected by isotopes only. Basic methods of analysis with deuterium oxide are considered. The use of deuterium oxide is considered. The use of deuterium oxide for clinical purposes is suggested. S.D.

A75-25024 # **Neurophysiological fundamentals of the effect of trace elements (Neirofiziologicheskie osnovy deistviia mikroelementov).** V. S. Raitses (Meditsinskii Institut, Ivano-Frankovsk, Ukrainian SSR). *Uspekhi Fiziologicheskikh Nauk,* vol. 6, Jan.-Mar. 1975, p. 119-144. 128 refs. In Russian.

The role played by trace elements in the nervous system activity is outlined. The data collected from the available literature and the results obtained through personal experiments define the effects of the ions of copper, manganese, cobalt, zinc, and other trace elements belonging to the class of indispensable trace elements, on the functional properties of interoceptors as well as on the functional state of the autonomic, neuromuscular, and central nervous systems. Hypothetic mechanisms accounting for the effect of trace elements on the nervous system are presented. It is shown that certain trace elements are not only permanent ingredients of the nervous tissue, but they are also involved in the biochemical and physiological processes that underlie nervous system activity. The use of trace elements in general practice and psychoneurological therapy is noted. S.D.

A75-25045 **Dynamics of the chemical evolution of earth's primitive atmosphere.** A. Bar-Nun and A. Shaviv (Jerusalem, Hebrew University, Jerusalem, Israel). *Icarus,* vol. 24, Feb. 1975, p. 197-210. 38 refs.

Single-pulse shock tube studies of the pyrolysis of hydrocarbons, their oxidation by water vapor and their reaction with molecular nitrogen are reported. It is concluded that solar radiation hitting the surface of primitive earth created thunderstorms at a rate similar to that on contemporary earth, and that these storms played a major role in chemical atmospheric evolution; that the greenhouse effect of acetylene and water vapor provided a regulatory mechanism which kept the acetylene concentration at a low level and prevented

large graphite and polymer deposits on the surface; that aldehydes and HCN were accumulated at a fast rate and reached high concentrations in the oceans; and that initially low surface temperatures could have been corrected by the greenhouse effect, while a surface temperature above the boiling point of water, at any stage during the formation of CO2, would have led to a situation similar to the Cytherean atmosphere. S.J.M.

A75-25058 Design and development of the British Mk.5. aircrew helmet assembly. J. Gregory (M.L. Aviation Co., Ltd., Maidenhead, Berks., England). In: Survival and Flight Equipment Association, Annual Conference and Trade Exhibit, 12th, Las Vegas, Nev., September 8-12, 1974, Proceedings. Canoga Park, Calif., Survival and Flight Equipment Association, 1975, p. 43-47. 6 refs.

The present work discusses the development philosophy, processes and methods used to achieve the finalized design specification of the Mk.5. aircrew helmet assembly. The design and development of the helmet was carried out in two phases: (1) design of a blast/anti-glare visor screen that would automatically close and lock as part of the ejection sequence, weight reduction of shell and chinbar, design of tape harness, oxygen mask configuration selection, incorporation of cold-molded glass-resin composite double cavity earpads, and impact testing; (2) improvement of blow-sustaining capability through production of a rigid light-weight epoxy GRP-polyethylene foam sandwich shell, design of an alternative visor closure mechanism, and improvement of sound attenuation properties through earpad modification. Further development is briefly considered. S.J.M.

A75-25059 A review of British aircrew helmet development. S. J. Lidstone (Ministry of Defence /Procurement Executive/, London, England). In: Survival and Flight Equipment Association, Annual Conference and Trade Exhibit, 12th, Las Vegas, Nev., September 8-12, 1974, Proceedings. Canoga Park, Calif., Survival and Flight Equipment Association, 1975, p. 48-52.

This paper describes British aircrew helmets in use and reviews performance requirements and the helmets being developed to meet particular operational needs. The following helmets are discussed in detail: Mark 4 - a general purpose protective helmet fitted with a side mounted double visor as an alternative to a glare visor when blast and bird strike debris protection are required. Mark 5 - a protective helmet designed particularly for use in high speed aircraft. A polycarbonate glare visor is lowered automatically in emergency to seal on a chin bar to provide blast and bird strike debris protection to the face and oxygen mask. Mark 7 - a communications headset and separate protective helmet shell which is worn over the headset during periods of hazard. Mark 8 - a 'quick-fit' version of the Mark 4 for short notice use. (Author)

A75-25060 U.S. Navy development of helmet compatible eyeglasses. C. S. Jencks (U.S. Naval Material Command, Naval Air Development Center, Warminster, Pa.). In: Survival and Flight Equipment Association, Annual Conference and Trade Exhibit, 12th, Las Vegas, Nev., September 8-12, 1974, Proceedings. Canoga Park, Calif., Survival and Flight Equipment Association, 1975, p. 53-57.

Aviator eyeglasses that are helmet/oxygen mask/eardome compatible are being developed as a component of a significantly improved fighter/attack helmet system. The glare-p. otective glasses eliminate the necessity for dual (clear/tinted) visors, t as contributing to a significant weight and inertia reduction, resulting in improved aviator head response. They also offer prescription lens capability for those needing eye correction. The construction of various prototypes is outlined and illustrated. S.J.M.

A75-25062 Physiological effects of long time sitting. F. Formeller (U.S. Naval Material Command, Naval Air Development Center, Warminster, Pa.). In: Survival and Flight Equipment Association, Annual Conference and Trade Exhibit, 12th, Las Vegas, Nev., September 8-12, 1974, Proceedings. Canoga Park, Calif., Survival and Flight Equipment Association, 1975, p. 63-67. 5 refs.

Measurement of parathesia and ischemia around the ischial tuberosities and the upper thighs due to prolonged sitting pressure is discussed. Testing methods used in the past are considered, and a physiological test program investigating the above effects and the influence on them by the Koch stimulator assembly of undulating air-bladder cushions is described. Results were established in two phases: (1) instrument calibration and determination of optimum working pressures and timing sequence; (2) concrete findings, such as infrared thermographs of skin blood flow, psychological discomfort index, rudder pedal human alertness response, impedance plethysmograph blood volume metering, and electroneuromyographs of nerve transmission time. Ejection seat studies with the Koch cushions were also performed. S.J.M.

A75-25071 The development and operational evaluation of the CSU-15/P anti-G coverall. R. Z. Snyder and M. Bush (U.S. Naval Material Command, Naval Air Development Center, Warminster, Pa.). In: Survival and Flight Equipment Association, Annual Conference and Trade Exhibit, 12th, Las Vegas, Nev., September 8-12, 1974, Proceedings. Canoga Park, Calif., Survival and Flight Equipment Association, 1975, p. 129-133.

The CSU-15/P anti-G coverall suit is described, and the results of a questionnaire administered to 1635 aviation personnel to whom the coveralls had been distributed for wear are presented. The CSU-15/P is intended as an eventual replacement for the MK-2A anti-G suit; it is a high temperature-resistant cutaway apparel with an integrated air hose assembly. Heat seal seams used and their advantages over cold-cemented ones are discussed. Specifications for fabrics with air-holding characteristics, as used in the air bladders of the CSU-15/P, are given. Most personnel found the suit good or excellent in terms of fit, compatibility with flight suit worn underneath, comfort, bladder inflation, pocket location, air hose location, Velcro adjustments, slide fasteners, launderability, and outer shell design. S.J.M.

A75-25137 * Elastic modulus of the human intact left ventricle - Determination and physiological interpretation. D. N. Ghista (Indian Institute of Technology, Madras, India), H. Sandler (NASA, Ames Research Center, Moffett Field, Calif.), and W. H. Vayo (Toledo, University, Toledo, Ohio). *Medical and Biological Engineering*, vol. 13, Mar. 1975, p. 151-161. 34 refs.

The left ventricle (l.v.) is represented as a shell of muscle whose performance is characterized in terms of the chamber pressure and stress/strain in the ventricular wall; the effective elastic modulus of the l.v. relates these performance variables, and hence represents the transfer function of the left ventricular physiological system. A method is presented for indirectly determining the effective modulus E for the left ventricle. The method employs a thick-walled mathematical model of the l.v. having a homogeneous isotropic medium. Instantaneous values of E are determined for subjects with heart diseases of varied etiologies, in order to assess the responses of the l.v. to chronic overloads of pressure and volume. Resulting values for E are used diagnostically to characterize the physiological state of the l.v. Normal values of E, at systole, indicate that the strength of contraction exercised by the l.v. is normal, and hence is an indication of the l.v. having adjusted to the heart disease. (Author)

A75-25138 In vivo elastic modulus of the left ventricle - Its determination by means of a left ventricular vibrational model and its physiological significance and clinical utility. D. N. Ghista, B. N. Rao (Indian Institute of Technology, Madras, India), and S. H. Advani (West Virginia, University, Morgantown, W. Va.). *Medical and Biological Engineering*, vol. 13, Mar. 1975, p. 162-170. 7 refs.

A75-25139 **A nonlinear model of the arterial vessels within a limb segment.** B. Jonson, R. Nilsen (Lund, University, Lund, Sweden), and H.-G. Karlsson (Lund Institute of Technology, Lund, Sweden). *Medical and Biological Engineering,* vol. 13, Mar. 1975, p. 209-213. 9 refs. Research supported by the Statens Naturvetenskapliga Forskningsrad; Swedish Medical Research Council Grant No. 14X-2872.

The relationship between the arterial blood pressure and the volume of the arteries within a segment of an extremity is nonlinear. The present paper shows how the flow and volume pulsations of the arteries within a limb segment can be simulated taking this property into account. An electrical model was constructed comprising one resistor and two voltage dependent 'capacitors', the latter corresponding to the pressure dependent elasticity, or compliance, of the arteries. Adequate simulations were obtained over a wide pressure range, which is impossible with linear models. The nonlinear, i.e., pressure dependent, relationship between the volume and pressure of arteries, observed under static conditions, must also be taken into consideration when studying pulsatile events with models whether mathematical or physical. (Author)

A75-25179 # **Activity of the human operator in man-machine systems (Deiatel'nost' cheloveka-operatora v sistemakh 'chelovek-mashina').** B. F. Lomov. *Akademiia Nauk SSSR, Vestnik,* Jan. 1975, p. 51-60. In Russian.

Several problems of human engineering relating to the active and passive behavior of the human operator in man-machine systems are explored. A general description of scalar systems used to measure the effectiveness and psychological state of a pilot at different times during a flight is presented. The discussion is centered on four stages of human activity in a man-machine system: information input and output, decision making, and implementation. It is proposed that the effectiveness and reliability of a man-machine system depend for the most part on human activity, and on the structure and psychological regulation of such activity. F.G.M.

A75-25219 **Finite element analysis of human cardiac structures.** M. S. Hamid and D. N. Ghista (Indian Institute of Technology, Madras, India). In: Finite element methods in engineering; Proceedings of the International Conference, Kensington, Australia, August 28-30, 1974. Kensington, Australia, Unisearch, Ltd., 1974, p. 337-348. 12 refs.

Finite element stress analyses of the left ventricular chamber (normal and partially infarcted) and the aortic valve are performed. They indicate the strength requirements for prosthetic aortic valves and heart chambers. The following characteristics of these cardiac structures are incorporated: (1) irregular three-dimensional left ventricular geometry, (2) finite deformations sustained by the aortic valve, and (3) nonlinear stress-strain properties of the aortic valve leaflet. S.J.M.

A75-25245 **Corrective saccades - Dependence on retinal reafferent signals.** C. Prablanc and M. Jeannerod (Institut National de la Santé et de la Recherche Médicale, Bron, Rhône, France). *Vision Research,* vol. 15, Apr. 1975, p. 465-469. 9 refs. Research sponsored by the Institut National de la Santé et de la Recherche Médicale and FRMF.

The saccadic response to a peripheral step stimulus is composed of a main saccade, and a corrective saccade with a shorter latency. When a single peripheral pulse stimulus is presented with a duration shorter than the latency of the response, the main saccade is not followed by a corrective one, though it is inaccurate. However when a second pulse synchronized to the first saccade is presented within some degrees around the new visual axis, it elicits a saccadic correction with a short latency. If the second pulse is presented at a larger retinal eccentricity, the saccadic correction is performed with a normal latency. The corrective saccade mechanism can be interpreted as a by-pass of decision time at the end of the main saccade if the residual retinal error does not exceed some degrees. (Author)

A75-25246 **Binocular detection of vertical and horizontal line segments.** D. H. Westendorf and R. Fox (Vanderbilt University, Nashville, Tenn.). *Vision Research,* vol. 15, Apr. 1975, p. 471-476. 18 refs. Grant No. NIH-EY-00590.

Forced-choice detection of small foveally viewed rectangular flashes was examined under monocular and binocular viewing conditions. When the two eyes were independently stimulated by flashes of the same orientation, either horizontal or vertical, detection was significantly greater than expected on the basis of probability summation. When one eye received a horizontal flash and the other a vertical flash, detection rates were at the level expected from probability summation. These results support the conclusion that binocular combination is selective at threshold and not accompanied by inhibition. (Author)

A75-25247 **The effect of motion on visual acuity of the compound eye - A theoretical analysis.** M. V. Srinivasan and G. D. Bernard (Yale University, New Haven, Conn.). *Vision Research,* vol. 15, Apr. 1975, p. 515-525. 30 refs. Research supported by the Connecticut Lions Eye Research Foundation; Grants No. NIH-EY-01140; No. NIH-EY-00785.

Spatial resolution of moving objects is examined at the level of the photoreceptor axons on a theoretical basis using a linear description of the receptor potential for low object contrasts, and computer simulation with a nonlinear model for high object contrasts. It is shown that: (1) the dynamic properties of transduction by the photoreceptor can cause visual acuity to be significantly affected by motion within the domain of biologically meaningful velocities; (2) eyes with better static visual acuity need faster photoreceptor dynamics if their visual acuity is to be retained up to a reasonable velocity. This requirement appears to be met by the compound eyes of several different species, and in a given eye as it changes its state of adaptation. (Author)

A75-25317 **A new form of biological power.** R. Reid and H. Leese (York, University, York, England). *New Scientist,* vol. 65, Feb. 6, 1975, p. 310-312.

Questions of ATP synthesis are considered, taking into account also studies of the asymmetry of electron carriers in bacterial membranes. Attention is given to the possibility that an arrangement of electron carriers in a fixed direction relative to one another could provide a mechanism for converting the energy of electron transport into an electrochemical gradient of protons across the membrane. The gradient itself could be the intermediate that drives ATP synthesis. In connection with these theories a new term 'proticity' has been defined denoting the flow of protons induced by a proton motive force. G.R.

A75-25319 # **Mechanisms of interaction of the otolith and ampullar regions of the vestibular apparatus in nystagmus initiation (O mekhanizmakh vzaimodeistviia ampuliarnogo i otolitovogo otdelov vestibuliarnogo apparata v formirovanii nistagma).** Iu. K. Stolbkov (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 61, Jan. 1975, p. 69-75. 17 refs. In Russian.

A75-25320 # **Recovery of chemoreceptor function following deafferentation of sinocarotid zones in rats (Voostanovlenie khemoretseptornoi funktsii posle deafferentatsii sinokarotidnykh zon u krys).** I. S. Breslav and E. A. Konza (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 61, Jan. 1975, p. 84-89. 11 refs. In Russian.

Ventilation responses to oxygen content variations in blood are investigated in acute experiments with rats subjected to the afferent excision of their sinocarotid chemoreceptor zones. Immediately after surgery, changes in pulmonary ventilation were observed to disappear

under conditions of respiration by hypoxic and hyperoxic gaseous mixtures; the respiratory response to intravenous KCN administration also disappears while responses to hypercapnia persist. The lost respiratory responses to hypoxic stimulus were found to be restored after a certain time, probably under the action of hypothetical chemosensitive formations located in the arterial network. A second surgery after a month revealed that recovery of chemosensitivity to hypoxic stimulus cannot be caused by regeneration of the sinocarotid chemoreceptors. S.D.

A75-25321 # Effect of Ca ions on the rhythmic and contractile activities of the heart (Vliianie ionov Ca na ritmicheskuiu i sokratitel'nuiu deiatel'nost' serdtsa). A. A. Abinder, N. K. Khitrov, Zh. E. Aslaniants, and A. I. Svistukhin (I Moskovskii Meditsinskii Institut, Moscow, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 61, Jan. 1975, p. 117-123. 18 refs. In Russian.

A75-25322 # Effect of selenium on the photosensitivity of the eye (O vliianii selena na svetovuiu chuvstvitel'nost' glaza). V. D. Bakharev, M. A. Bocharova, and V. I. Shostak (Voenno-Meditsinskaia Akademiia, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 61, Jan. 1975, p. 150-152. 8 refs. In Russian.

Experiments were conducted to determine quantitatively the effect of substances containing selenium on the photosensitivity of the eye, as well as to evaluate the time of dark adaptation of the retina in rabbits. Use was made of a 0.1% sodium selenite solution administered subcutaneously, in conjunction with photostimulation by light flashes of various intensities. It was found that sodium selenite has a stimulating effect on the ERG-parameters, particularly the a-wave and the b-wave, which indicates an increase in the photosensitivity of the retina. The most pronounced effect was obtained with photostimuli of threshold and maximal intensities, and a higher rate of recovery of retinal photosensitivity was observed in dark-adapted rabbits. Several interpretations for the stimulating effect of selenium are noted. S.D.

A75-25323 # Asymmetric nature of light-induced suppression of optokinetic and reverse post-optikinetic nystagmuses (Asimmetrichnyi kharakter svetovogo ugneteniia optokineticheskogo i reversivnogo postoptokineticheskogo nistagmov). V. P. Neverov (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 61, Jan. 1975, p. 157-159. 6 refs. In Russian.

A75-25325 Effects of postural changes on the head response of standing subjects subjected to low frequency 'constant velocity' spectral inputs. B. K. N. Rao, C. Ashley, and B. Jones (Birmingham, University, Birmingham, England). *Society of Environmental Engineers, Journal*, vol. 14-1, Mar. 1975, p. 27-30. 13 refs. Research supported by the Science Research Council.

A75-25395 # Investigation of coacervate drops of ferrous oxide hydrate (Issledovanie koatservatnykh kapel' iz gidrata zakisi zheleza). T. N. Evreinova, L. G. Minaeva, L. Ia. Kizil'shtein, T. V. Mamontova, L. L. Litinskaia, and Iu. R. Khrust (Moskovskii Gosudarstvennyi Universitet, Moscow; Rostovskii-na-Donu Gosudarstvennyi Universitet, Rostov, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 220, Jan. 11, 1975, p. 475-477. 7 refs. In Russian.

The concentration properties of ferrous oxide hydrate during the formation of coacervate drops from it are investigated. A 1% aqueous solution of Mohr salt was mixed with an alkaline solution of Seignette salt to obtain coacervate drops, and the size of the drops and the concentrations of ferrous oxide hydrate and free iron in the drops were measured. An inverse dependence is found between the size of the drops and the hydrate concentration. It is concluded that mineral coacervate drops have the same dependence between linear and weight parameters as do organic compounds, such as proteins and nucleic acids. F.G.M.

A75-25405 Efficiency of constant-flow oxygen masks for general aviation - A new method of mask evaluation. J. W. Brantigan (Utah, University, Salt Lake City, Utah). *Aviation, Space, and Environmental Medicine*, vol. 46, Mar. 1975, p. 231-240. 11 refs.

A75-25406 Excitability of the cortex in normal and adrenalectomized rats during repeated exposures to high oxygen pressure. I. D. Torbati, S. Lavy (Jerusalem, Hebrew University, Jerusalem, Israel), and D. Harel (Rotschild Hospital, Haifa, Israel). *Aviation, Space, and Environmental Medicine*, vol. 46, Mar. 1975, p. 241-243. 17 refs.

The excitability of the cortex in adrenalectomized and normal adult male rats to High Oxygen Pressure (HOP) was studied 2, 3, 4, 6, 8, 12 and 22 d after bilateral adrenalectomy and implantation of cerebral electrodes. Continuous electroencephalographic (EEG) recordings were obtained until the appearance of the first paroxysmal electrical discharges, which was considered to be the first indicator of the toxic effects of hyperbaric oxygen. A statistically significant change in excitability of the cortex to oxygen toxicity from 2 to 22 d following adrenalectomy was shown. Comparison of the sensitivity of the normal and adrenalectomized rats to HOP 2 d after the operation showed significant resistance of adrenalectomized rats at this time. This resistance disappeared gradually, when compared with normal rats, and cortical susceptibility increased significantly 22 d after adrenalectomy. The possible disturbances responsible for the changes in excitability of the cortex to HOP in adrenalectomized rats are discussed. (Author)

A75-25407 * Effects of long-term rotation and hypergravity on developing rat femurs. S. D. Smith (Kentucky, University, Lexington, Ky.). *Aviation, Space, and Environmental Medicine*, vol. 46, Mar. 1975, p. 248-253. 9 refs. Grant No. NGL-18-001-003.

Male and female Sprague-Dawley rats derived from a single mating were raised for three generations under constant centrifugation at 1.03 G (Rotation Controls) and at 2 G. When the third generation rats were 3 months old, they were sacrificed, and their femurs removed. After fixation and cleaning, the femurs were then measured for length and diameter. Then right femurs were sectioned longitudinally, left femurs transversely. After staining with Hematoxylin and Eosin, right femurs were examined for ossification patterns and left femurs were measured for cortical thickness. All rotation control rats showed marked stimulation of ossification in the femoral head, and males showed significant cortical thinning when compared to non-rotated earth gravity controls. All 2 G femurs showed decreased length and aspect (L/D) ratios, and increased cortical thickness/diameter ratios when compared to earth controls or rotation controls. Ossification of the femoral head was slightly advanced, while the distal epiphyseal plate was thinned. (Author)

A75-25408 Increased susceptibility to pulmonary oxygen toxicity after cholesterol biosynthesis inhibition. J. B. Brodsky (Harvard University; Beth Israel Hospital, Boston, Mass.). *Aviation, Space and Environmental Medicine*, vol. 46, Mar. 1975, p. 254-258. 26 refs. Grants No. NIH-GM-15904; No. NIH-HL-05422.

Effects of AY-9944, a cholesterol biosynthesis inhibitor, were investigated in rats. Injection was performed before exposure to oxygen at atmospheric pressure (OAP) for varying lengths of time. AY-9944 rats had a higher mortality rate in OAP than did uninjected controls and animals injected with saline solution or saline plus hydrocortisone phosphate. This finding is surprising in view of the increase in pulmonary surfactants protective against O2 known to result from corticosteroid synthesis inhibition. S.J.M.

A75-25409 * Influence of head orientation on visually induced pitch and roll sensation. L. R. Young, C. M. Oman, and J. M. Dichgans (MIT, Cambridge, Mass.; Neurologische Universitätsklinik, Freiburg im Breisgau, West Germany). *Aviation, Space, and Environmental Medicine*, vol. 46, Mar. 1975, p. 264-268. 31 refs. Grant No. NGR-22-009-701.

Observers viewing rotating scenes in their periphery frequently experience self-motion in the opposite direction. A full field flight simulator projection system was used to investigate the sensations resulting from pitch, roll, and yaw stimuli at various head orientations. Steady yaw rate (circularvection) and development of a constant roll tilt angle, for the head erect and constant velocity yaw and roll stimuli, confirmed previous reports. Pitch stimuli also were found to produce a sensation of tilting to a steady pitch angle, which was much stronger for pitch forward than backward. Pitch and roll effects were strongly dependent on head position, increasing for the head rolled 90 deg to the side or inverted, and decreasing for the head pitched 25 deg forward. These results support a hypothesis that visually induced tilt is limited by conflict with otolith information. (Author)

A75-25410 Vertical vibration of seated subjects - Effects of posture, vibration level, and frequency. M. J. Griffin (Southampton, University, Southampton, England). *Aviation, Space, and Environmental Medicine,* vol. 46, Mar. 1975, p. 269-276. 12 refs.

A75-25411 Electrical response of the eye at varying intervals following an adapting flash exposure. G. T. Chisum (U.S. Naval Material Command, Naval Air Development Center, Warminster, Pa.). *Aviation, Space, and Environmental Medicine,* vol. 46, Mar. 1975, p. 277-280. 12 refs.

Electroretinograms (ERG) were recorded at varying intervals following an adapting flash exposure. Both amplitude and latency variations are exhibited for short interflash intervals. The ERG following the longer interflash intervals are not significantly different from the dark-adapted ERG. The relationship between the electrophysiological and psychophysical data is discussed. (Author)

A75-25412 Potential crew hazards due to radioactive cloud penetrations. R. P. Patrick (USAF, Weapons Laboratory, Kirtland AFB, N. Mex.). *Aviation, Space, and Environmental Medicine,* vol. 46, Mar. 1975, p. 281-289. 8 refs. AF Project 8809; AF Task 03.

Potential crew hazards resulting from radioactive cloud penetrations are investigated and the seriousness of each potential hazard is discussed. Preventive measures to alleviate the potential hazards are discussed. (Author)

A75-25413 Absence of nyctohemeral variation in stress-induced ACTH secretion in the rat. C. F. Allen (USAF, School of Aerospace Medicine, Brooks AFB; Southwest Foundation for Research and Education, San Antonio, Tex.), J. P. Allen (USAF, School of Aerospace Medicine, Brooks AFB, Tex.), and M. A. Greer (USAF, School of Aerospace Medicine, Brooks AFB, Tex.; Oregon, University, Portland, Ore.). *Aviation, Space, and Environmental Medicine,* vol. 46, Mar. 1975, p. 296-299. 18 refs. NIH-supported research.

Adult male rats were monitored for plasma ACTH concentration at 0400 and 1600 hours after controls, pentobarbital anesthetization, or anesthesia plus 2.5-min torniquet stress. No significant difference in post-anesthesis, post-stress overall blood ACTH content or in increment ACTH response was observed between morning and afternoon, except in controls, where 0400 exceeded 1600 ACTH. Plasma corticosterone in this last group was higher in the afternoon and lower in the morning. This suggests variable adrenal sensitivity to ACTH as a factor in corticosterone rhythm. S.J.M.

A75-25414 * Oxygen cost during exercise in simulated subgravity environments. E. L. Fox, R. L. Bartels, E. C. Chaloupka, J. E. Klinzing, and J. Hoche (Ohio State University, Columbus, Ohio; U.S. Navy, Naval Aeromedical Research Laboratory, Pensacola, Fla.). *Aviation, Space, and Environmental Medicine,* vol. 46, Mar. 1975, p. 300-303. 6 refs. NASA-Navy-supported research.

Oxygen cost (VO2) and heart rate (HR) were determined during treadmill walking in simulated subgravity environments. The long axis of the subject's body was suspended parallel to the floor in a slow rotation room with feet aligned on the surface of a treadmill mounted 90 deg on the wall. Without rotation, the subjects were virtually weightless against the treadmill; with centrifugation, environments of 0.25, 0.5 and 1 G were simulated. Oxygen cost (open circuit) and HR (ECG) were measured during the 5th minute of walking at 3.2, 4.7 and 6.1 km/h. Similar measurements were also determined during walking at 1/2-G using the inclined plane technique. Oxygen cost per unit mass and HR were significantly reduced in all subgravity environments. However, net oxygen cost per unit weight carried and, therefore, mechanical efficiency was found to be independent of gravity. This supports the idea that the most probable cause for the decreased oxygen cost with reduced gravity is less body weight carried. (Author)

A75-25415 * Comparisons of pilot performance in simulated and actual flight. C. E. Billings, R. J. Gerke, and R. L. Wick, Jr. (Ohio State University, Columbus, Ohio; NASA, Ames Research Center, Man-Machine Integration Branch, Moffett Field, Calif.). *Aviation, Space, and Environmental Medicine,* vol. 46, Mar. 1975, p. 304-308. 22 refs. Contract No. F3315-72-C-1308.

Five highly experienced professional pilots performed instrument landing system approaches under simulated instrument flight conditions in a Cessna 172 airplane and in a Link-Singer GAT-1 simulator while under the influence of orally administered secobarbital (0, 100, and 200 mg). Tracking performance in two axes and airspeed control were evaluated continuously during each approach. Error and RMS variability were about half as large in the simulator as in the airplane. The observed data were more strongly associated with the drug level in the simulator than in the airplane. Further, the drug-related effects were more consistent in the simulator. Improvement in performance suggestive of learning effects were seen in the simulator, but not in actual flight. (Author)

A75-25416 Personality factors in selection and flight proficiency. R. L. Christy. *Aviation, Space, and Environmental Medicine,* vol. 46, Mar. 1975, p. 309-311. 7 refs.

Personality development is a dynamic process involving life forces, instinct drives, growth processes, life stresses, reactions to significant persons, both in and out of the family, and reactions to the environment in general, along with the mastery of methods and techniques for coping in solving problems and in providing for the satisfaction of one's needs. The love and fear of flying and the motivation and conflicts in flying involve many personality factors which deserve careful evaluation in selection of pilot and other flight personnel. These personality factors, variations, and traits also require close surveillance of pilot personnel by flight surgeons, aviation medical and operational personnel in predicting and preventing potential breakdown or difficulties and, more importantly, in the interest of maintaining optimum personnel effectiveness, proficiency, and safety in aviation. (Author)

A75-25417 Human factors in Air Force aircraft accidents. S. T. Lewis (USAF, Inspection and Safety Center, Norton AFB, Calif.). *Aviation, Space, and Environmental-Medicine,* vol. 46, Mar. 1975, p. 316-318.

Advances have been made in the design and reliability of Air Force aircraft; however, there continues to be material failure accidents. The design of man has not changed, although training programs have been improved to reduce accidents caused by human error. This study was conducted to determine the human factors causation of aircraft accidents. A review of 545 aircraft accidents revealed that over 50% were caused by human error. These errors involved supervision, limited experience, and errors in judgment. Since materiel factors in accidents have remained relatively constant, more emphasis must be placed on training and selection of our aircrews and supervisors. (Author)

A75-25418 **Preliminary results of examinations of rats after a 22-day flight aboard the Cosmos-605 biosatellite.** E. A. Il'in, L. V. Serova, V. V. Portugalov, R. A. Tigranian, E. A. Savina, M. S. Gaevskaia, Iu. I. Kondrat'ev, A. D. Noskin, V. I. Miliavskii, and B. N. Iurov (Ministry of Health, Institute of Biomedicine Problems, Moscow, USSR). *Aviation, Space, and Environmental Medicine,* vol. 46, Mar. 1975, p. 319-321.

The results of biomedical investigations carried out in flights of the Salyut and Skylab orbital stations give evidence that during prolonged weightlessness cosmonauts and astronauts remain in a good physical and mental condition. In order to make reliable plans for such missions, it is necessary to accumulate detailed knowledge about the mechanism of the effect of weightlessness on different functions of the human body. In addition to manned experiments, of great interest are animal experiments. They may yield data that cannot be obtained in human studies, which is obviously very important from the point of view of space medicine. Preliminary results of examinations of rats after a 22-d space flight in the Cosmos-605 satellite demonstrated not only physiological and biochemical but also morphological changes in the animal body due to prolonged weightlessness. These changes were reversible. (Author)

A75-25589 # **Effect of the ferment polynucleotidephosphorylase in a protein-carbohydrate coacervate system (Deistvie fermenta polinukleotidfosforilazy v belkovouglevodnoi koatservatnoi sisteme).** T. N. Evreinova, A. F. Orlovskii, and A. I. Oparin (Akademiia Nauk SSSR, Institut Biokhimii; Moskovskii Gosudarstvennyi Universitet, Moscow, USSR). *Akademiia Nauk SSSR, Doklady,* vol. 220, Jan. 21, 1975, p. 733-735. 7 refs. In Russian.

A75-25590 # **Ion composition of labyrinth receptor cells and their environment (Ionnye sostav retseptornykh kletok labirinta i okruzhaiushchei ikh sredy).** B. A. Allakhverdov, I. V. Burovina, V. I. Govardovskii, and K. A. Koichev (Akademiia Nauk SSSR, Institut Evoliutsionnoi Fiziologii i Biokhimii, Leningrad; Akademiia Nauk SSSR, Institut Biofiziki, Pushchino-on-Oke, USSR; Meditsinska Akademiia, Sofia, Bulgaria). *Akademiia Nauk SSSR, Doklady,* vol. 220, Jan. 21, 1975, p. 746-748. 13 refs. In Russian.

A75-25591 # **Activation of extrarenal means of sodium secretion during adaptation to hypoxia and its role in the prophylaxis of experimental hypertension (Aktivatsiia vnepochechnykh putei vydeleniia natriia pri adaptatsii k gipoksii i ee rol' v profilaktike eksperimental'noi gipertonii).** F. Z. Meerson, N. A. Barbarash, and Iu. P. Shorin (Akademiia Meditsinskikh Nauk, Moscow; Kemerovskii Meditsinskii Institut, Kemerovo, USSR). *Akademiia Nauk SSSR, Doklady,* vol. 220, Jan. 21, 1975, p. 749-751. 20 refs. In Russian.

A75-25595 # **Dependence of the temperature distribution in the human body on the behavioral modes of hyperthermia (Zavisimost' raspredeleniia temperatury v tele cheloveka ot rezhimov provedeniia gipertermii).** O. V. Korobko, S. Z. Fradkin (Akademiia Nauk Belorusskoi SSR, Institut Teplo- i Massoobmena, Minsk, Belorussian SSR), and T. L. Perel'man. *Inzhenerno-Fizicheskii Zhurnal,* vol. 28, Jan. 1975, p. 113-118. In Russian.

A75-25598 # **Evolution of ideas on the origin of life over the years 1924-1974 (Evoliutsiia predstavlenii o proiskhozhdenii zhizni 1924-1974 gg.).** A. I. Oparin (Academy of Sciences, Institute of Biochemistry, Moscow, USSR). *(Akademiia Nauk SSSR, Mezhdunarodnyi Seminar po Proiskhozhdeniiu Zhizni, Moscow, USSR, Aug. 2-7, 1974.) Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaia,* Jan.-Feb. 1975, p. 5-10. In Russian.

The present work discusses some significant changes in modern views concerning the origin of life on earth. These views center around three points: (1) the cosmic origin of primary organic matter for evolution, (2) the recurrence of the origin of life on earth, and (3) the necessity of the formation of phase-independent, discrete systems for the origin of natural selection and the transition from chemical to biological evolution. Although general principles concerning origin of life on earth have not changed much, the accumulation of new data, especially concerning the nonbiogenic formation of organic matter, has altered the picture somewhat.

P.T.H.

A75-25599 # **Molecular principles of the action of high-energy hadrons and results of biological studies in space (Molekuliarnye osnovy deistviia adronov vysokoi energii i rezul'taty biologicheskikh issledovanii v kosmose).** I. G. Akoev and S. S. Iurov (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino-on-Oka, USSR). *Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaia,* Jan.-Feb. 1975, p. 11-24. 87 refs. In Russian.

A75-25639 # **Physics and biology (Fizika i biologiia).** S. E. Bresler (Akademiia Nauk SSSR, Institut Iadernoi Fiziki, Leningrad, USSR). *Uspekhi Fizicheskikh Nauk,* vol. 115, Jan. 1975, p. 121-143. 16 refs. In Russian.

Following a brief review of the progress made during the past 20 years in the development of molecular biology (biophysics), the discussion is focused on three major unresolved problems in this field. The first is the problem of morphogenesis, i.e., the formation of submolecular structures from molecules of various classes. The second, is the differentiation and development of an embrio of a complex organism (known as ontogenesis), and the third is the problem of neurobiology, i.e., the determination of the operational mechanism of the nervous system and the decoding of the neurobiological code, with the aim of identifying the mechanism of human consciousness. The application of physical methods to these problems is examined. V.P.

A75-25665 # **Effect of long and frequently repeated emotional influence on heart (Efekt trivalogo i bagatorazovogo emotsional'nogo vplivu na sertse).** O. B. Fel'dman and O. V. Obonits'ka (Donets'kii Medichnii Institut, Donetsk, Ukrainian SSR). *Fiziologichnii Zhurnal,* vol. 21, Jan.-Feb. 1975, p. 63-68. 15 refs. In Ukrainian.

Two-phase changes in electrocardiogram were observed in the experiments on 6 dogs with long (60 minutes) emotional excitement. The first stage of emotional excitement was characterized by heart acceleration during the whole period of emotional excitement and by the transitory changes in jags and intervals of electrocardiogram reflecting possible disorders of coronary circulation. The second phase acting in 1.5-2 hours after cessation of the emotional excitement was expressed by slowing the rhythm and small disorders of cardiac flood flow. With daily repeated one-hour emotional excitement a weakening of reaction was observed in electrocardiogram jag form and that of intervals, the heart acceleration being maintained. (Author)

A75-25666 # **Role of exhaustion of cerebral-cortex functional potential in the disorder of the activity of the adrenal gland cortex (Rol' visnazhennia funktsional'nogo potentsialu kori golovnogo mozku v porushenni diial'nosti kori nadnirkovikh zaloz).** B. A. Vartapetov and G. D. Sudakova (Kharkivs'kii Institut Endokrinologii i Khimii Gormoniv, Kharkov, Ukrainian SSR). *Fiziologichnii Zhurnal,* vol. 21, Jan.-Feb. 1975, p. 69-74. 9 refs. In Ukrainian.

A75-25667 # **Hyperoxia and chemical resistance of erythrocytic membranes (Giperoksiia ta khimichna rezistentnist' eritrotsitarnikh membran).** V. V. Matsinin (Akademiia Nauk Ukrains'koi RSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal,* vol. 21, Jan.-Feb. 1975, p. 110-114. 21 refs. In Ukrainian.

Albino rats were subjected to the effect of oxygen at a pressure of 5 at. for 60-90 min. They were also decapitated and the gathered blood was studied by the method of chemical erythrograms, muriatic acid and saponin being used as hemolytic agents. A decrease was found in acidic and saponin resistance of erythrocytes in the animals which suffered from hyperoxia. The results obtained are compared with the phenomenon of the biomembranes self-stripping under

peroxide oxidation and a decrease in the chemical resistance of erythrocytes with aging. An assumption is advanced on the 'aging' effect of hyperoxia. (Author)

A75-25668 # **Elements of the development in man of endurance to local coolings and the rules of G. V. Fol'bort (Elementi zagartovuvannia liudini do mistsevikh okholodzhen' i 'Pravila G. V. Fol'borta').** A. K. Podshibiakin (Kiivs'kii Institut Medichnikh Problem Fizichnoi Kul'turi, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal,* vol. 21, Jan.-Feb. 1975, p. 119-123. 18 refs. In Ukrainian.

The present work describes an experiment on the adaptation of human subjects to the effects of applied local coolings. The time required for skin temperature to be restored after local cooling was found to be determined by the rate at which the cooling effect was brought about. Adaptation to cooling takes place only when each subsequent cold effect is brought about under conditions of complete restoral of the temperature of the adapted zone. Fol'bort's rules concerning the importance of chemical shift in the response reaction of an organ or tissue and in the rate at which restorative processes take place in them, and also concerning adaptation only on the condition of their restored and strengthened state, can be used to develop theory and practice of man's adaptation to local coolings. P.T.H.

A75-25669 # **Exhaustion without lowering of working capacity during activity (Visnazhennia bez znizhennia pratsezdatnosti pid chas diial'nosti).** V. I. Zav'ialov (Kiivs'kii Medichnii Institut, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal,* vol. 21, Jan.-Feb. 1975, p. 126-128. 8 refs. In Ukrainian.

The dynamics of work capacity of the salivary glands in dogs and of the skeletal muscles in rabbits was studied over extended periods of their activity beyond the time normally required for a decrease of the functional potential of the organ. It was found that the depth of exhaustion can reach a level much lower than indicated by any functional signs. This is discussed in terms of the destruction of the normal connection between exhaustion and inhibitory processes. P.T.H.

A75-25704 The chemical basis of extraterrestrial life. C. Ponnamperuma (Maryland, University, College Park, Md.). In: Interstellar communication: Scientific perspectives. Boston, Houghton Mifflin Co., 1974, p. 45-58. 9 refs.

The factors which make the scientific study of questions regarding the origin of life possible are related to astronomical considerations, recent developments in biochemistry, and the triumph of Darwinian evolution. Questions of chemical evolution are considered, giving attention to the atmospheric conditions on a juvenile planet, sources of energy on the primitive earth, laboratory experiments concerning developments of chemical evolution, the interaction of amino acids and nucleotides, experiments simulating the planet Jupiter, the search for molecules of biological significance in ancient rocks and sediments, organic compounds found in meteorites, and interstellar organic molecules. G.R.

A75-25705 The likelihood of the evolution of communicating intelligences on other planets. M. A. Arbib (Massachusetts, University, Amherst, Mass.). In: Interstellar communication: Scientific perspectives. Boston, Houghton Mifflin Co., 1974, p. 59-78.

The possibility of interstellar communication with another intelligent community will very much depend on the characteristics of that community and the particular form of intelligence involved. Basic ingredients in the current theory of the evolution of life on earth are considered and attention is given to the question whether in other places in space there might not be entirely different forms of life which have evolved on the basis of other evolutionary principles. Questions concerning self-reproducing machines are examined. The evolution of human intelligence is discussed along with aspects of cultural evolution and requirements to find for the content of interstellar messages a basis which is shared by the recipients of these messages. G.R.

A75-25706 From chemical to biological to social evolution. S. Aronoff (Simon Fraser University, Burnaby, British Columbia, Canada). In: Interstellar communication: Scientific perspectives. Boston, Houghton Mifflin Co., 1974, p. 88-99. 13 refs.

The conditions for a transition from chemical to biological evolution are considered along with the basic characteristics of biologic evolution and the nature of the process of social evolution. Questions concerning homo sapiens and the social evolution are investigated, taking into account possibilities regarding the acquisition of unlimited sources of energy and the acquisition of detailed self-knowledge. The development of the social-evolutionary model is discussed. It is concluded that the period of biological evolution is drawing to a close and that mankind is entering a new period of social evolution. G.R.

A75-25722 * **Choice-reaction time to visual motion with varied levels of simultaneous rotary motion.** B. Clark (San Jose State University, San Jose, Calif.) and J. D. Stewart (NASA, Ames Research Center, Moffett Field, Calif.). *American Journal of Psychology,* vol. 87, Sept. 1974, p. 441-448. 20 refs. Grant No. NGL-05-046-002.

Twelve airline pilots were studied to determine the effects of whole-body rotation on choice-reaction time to the horizontal motion of a line on a cathode-ray tube. On each trial, one of five levels of visual acceleration and five corresponding proportions of rotary acceleration were presented simultaneously. Reaction time to the visual motion decreased with increasing levels of visual motion and increased with increasing proportions of rotary acceleration. The results conflict with general theories of facilitation during double stimulation but are consistent with neural-clock model of sensory interaction in choice-reaction time. (Author)

A75-25932 Ultrasonic cardiac imaging and image enhancement techniques. D. H. McSherry and J. R. Keller (Digicon, Inc., Houston, Tex.). In: Ultrasonics Symposium, Milwaukee, Wis., November 11-14, 1974, Proceedings. New York, Institute of Electrical and Electronics Engineers, Inc., 1974, p. 5-11. 18 refs.

Average cross-sectional images of the heart can be obtained from ultrasound scans done over a number of heart beats if the electrocardiogram is used to monitor the phase of the heart cycle and if irregular cycles are excluded. With echoes, EKG, and transducer position information recorded digitally, considerable signal processing can then be employed to improve signal resolution before forming an image for display. Band-pass filters can be used to eliminate certain types of noise and to reduce the dynamic range to a level appropriate for the limitations of the display device. Two-dimensional smoothing filters are used to alter the spatial frequencies to smooth boundaries and various gradient techniques have been employed for edge enhancement or for specifying contours. Displaying the serial images in a format similar to that used in cineangiography allows further study and comparison of these techniques. (Author)

A75-25956 * **Thermodynamic perspectives and the origin of life.** S. W. Fox (Miami, University, Coral Gables, Fla.). *(Conference on Unity in the Natural Sciences, University of Miami, Coral Gables, Fla., Nov. 27, 1973.)* In: Quantum statistical mechanics in the natural sciences. New York, Plenum Publishing Corp., 1974, p. 119-142. 32 refs. Grant No. NGR-10-007-008.

A qualitative appraisal of a recently enlarged laboratory model for macromolecular and cellular origins is given. The experiments

were performed under geologically relevant conditions, i.e., with irreversible thermodynamics, emphasizing open systems and changes in phase. It was found that heating appropriate nonneutral alpha-amino acids with other alpha-amino acids yields partly branched, mainly linear, copolymeric peptides incorporating some of the alpha-amino acids that would of themselves decompose. The resultant copolyamino acids display a high degree of internal order, enzymelike activities, enzymelike characteristics, and a tendency to form a kind of cell having many of the properties of contemporary cells. S.J.M.

A75-25957 * **The human auditory evoked response.** R. Galambos (California, University, La Jolla, Calif.). In: Sensation and measurement. Dordrecht, D. Reidel Publishing Co., 1974, p. 215-221. 13 refs. Grant No. NGR-05-009-198.

Figures are presented of computer-averaged auditory evoked responses (AERs) that point to the existence of a completely endogenous brain event. A series of regular clicks or tones was administered to the ear, and 'odd-balls' of different intensity or frequency respectively were included. Subjects were asked either to ignore the sounds (to read or do something else) or to attend to the stimuli. When they listened and counted the odd-balls, a P3 wave occurred at 300msec after stimulus. When the odd-balls consisted of omitted clicks or tone bursts, a similar response was observed. This could not have come from auditory nerve, but only from cortex. It is evidence of recognition, a conscious process. S.J.M.

A75-26033 * **Life sciences payloads for Shuttle.** R. W. Dunning (NASA, Washington, D.C.). In: EASCON '74; Electronics and Aerospace Systems Convention, Washington, D.C., October 7-9, 1974, Record. New York, Institute of Electrical and Electronics Engineers, Inc., 1974, p. 10-10Q. 16 refs.

The Life Sciences Program for utilization of the Shuttle in the 1980's is presented. Requirements for life sciences research experiments in space flight are discussed along with study results of designs to meet these requirements. The span of life sciences interests in biomedicine, biology, man system integration, bioinstrumentation and life support/protective systems is described with a listing of the research areas encompassed in these descriptions. This is followed by a description of the approach used to derive from the life sciences disciplines, the research functions and instrumentation required for an orbital research program. Space Shuttle design options for life sciences experiments are identified and described. Details are presented for Spacelab laboratories for dedicated missions, mini-labs with carry on characteristics and carry on experiments for shared payload missions and free flying satellites to be deployed and retrieved by the Shuttle. (Author)

A75-26120 # **Evaluating the onboard regimen of pilot nutrition (K otsenke rezhima bortovogo pitaniia letchikov).** D. N. Gavriliuk, I. G. Krasnykh, I. G. Popov, and V. E. Potkin. *Voenno-Meditsinskii Zhurnal,* Jan. 1975, p. 54-56. In Russian.

Two onboard regimens of pilot nutrition were investigated for a period of 36 hours each. The first regimen concerns an obligatory intake of all prescribed rations every 4 hours (first series of observations), while the second one consists of eating according to appetite, but at least every 6 hours (second series of observations). The observations are carried out for several types of pilot activity. From a physiological point of view, for restricted human motion the second regimen is better than the first, where an excessive repletion of the stomach, and especially of the large intestine, associated with meteorism, may substantially affect the attitude and efficiency of the pilot in flight. S.D.

A75-26121 # **Reaction of the hypothalamic-hypophysial-adrenal system under the action of a SHF field (Reaktsiia gipotalamo-gipofizarno-nadpochechnikovoi sistemy pri vozdeistvii SVCh polia).** E. F. Murashov and P. E. Krasnobaev. *Voenno-Meditsinskii Zhurnal,* Jan. 1975, p. 56, 57. In Russian.

A75-26122 # **Psychophysiological monitoring principles and the evaluation of pilot fitness to flight (Psikhofiziologicheskie printsipy kontrolia i otsenki gotovnosti letchika k poletam).** V. F. Zhernavkov and V. G. Kuznetsov. *Voenno-Meditsinskii Zhurnal,* Jan. 1975, p. 58-60. In Russian.

Psychophysiological reactions of pilot trainees are considered from the viewpoint of the corresponding fundamental standards of response. A reaction standard is defined as a dynamic concept which is individual and relatively constant for specific flying activities so that the activity level of physiological systems in man is determined by the different conditions of the activity and the adaptive degree of the organism in the course of training. The results obtained show that there exists a definite optimum value of neuro-emotional stress for which a specific task is achieved in a stable fashion with less errors. The principal criteria for the evaluation of pilot fitness are also provided. S.D.

STAR ENTRIES

N75-17934*# Hardin-Simmons Univ., Abilene, Tex. Microbiology Labs.
RESPONSE OF SELECTED MICROORGANISMS TO EXPERIMENTAL PLANETARY ENVIRONMENTS Semiannual Progress Report, 1 Jul. 1974 - 31 Dec. 1974
Terry L. Foster, Luther Winans, Jr., and Raymond Carroll Casey Jan. 1975 51 p
(Grant NGR-44-095-001)
(NASA-CR-136758; SAPR-5) Avail: NTIS HC $4.25 CSCL 06M

Experiments indicate that hardy organisms will likely grow in the Martian environment if moisture is available, and that these organisms definitely present a threat to contamination of the biopackage if they are transported to the surface of Mars.
Author

N75-17935# Naval Aerospace Medical Research Lab., Pensacola, Fla.
A PSYCHOBIOLOGICAL STUDY OF RHESUS MONKEYS EXPOSED TO EXTREMELY LOW FREQUENCY-LOW INTENSITY MAGNETIC FIELDS Medical Research Interim Report
John deLorge 16 May 1974 31 p refs
(MF51524015)
(AD-A000078; NAMRL-1203) Avail: NTIS CSCL 06/18

Communications systems have been shown to produce extremely low frequency (ELF) nonionizing radiation at low intensities. Several studies indicate that radiation within these ranges might have biological effects. The present study contained a number of experiments designed to reveal various behavioral and biochemical changes potentially induced by ELF magnetic fields. Magnetic fields between 8.2 and 0.00093 T alternating at 45 or 15 Hz had no consistent effects on operant behavior in four rhesus monkeys. No hematological changes were found to relate to the presence or absence of the fields although such changes were related to food deprivation.
GRA

N75-17936# Advisory Group for Aerospace Research and Development, Paris (France).
AN ANTHROPOMETRIC SURVEY OF 2000 ROYAL AIR FORCE AIRCREW, 1970/71
C. B. Bolton (RAE), M. Kenward (Loughborough Univ.), R. E. Simpson (RAE), and G. M. Turner (RAF) Dec. 1974 84 p refs
(AGARD-AG-181; AGARDograph-181) Avail: NTIS HC $4.75

An anthropometric survey of 2000 Royal Air Force aircrew personnel was conducted. Comparisons of means of certain body dimensions are shown for surveys conducted during periods from 1944 to 1971. The apparatus used on the procedures for conducting the measurements are reported. Other subjects discussed include the following: (1) sociological data, (2) the choice of measurements, (3) data recoding and processing, and (4) check measurements. Photographs of subjects being measured are provided. Results of the measurements are tabulated.
Author

N75-17937*# Scientific Translation Service, Santa Barbara, Calif.
LIFE IN ORBIT
G. Dimov Washington NASA Feb. 1975 5 p Transl. into ENGLISH from Izv. (USSR), no. 269, 17 Nov. 1974 p 3
(Contract NASw-2483)
(NASA-TT-F-16215) Avail: NTIS HC $3.25 CSCL 06E

A description is given of the Fifth conference of the joint Soviet-American working group on space biology and medicine at Tashkent.
Author

N75-17938*# Kanner (Leo) Associates, Redwood City, Calif.
THE REACTION OF THE RESISTIVE AND CAPACITIVE VESSELS OF THE HAND AT THE START OF MUSCULAR EXERCISE
J. M. Verpillat, A. Ghaem, B. Levy, and J. P. Martineaud Washington NASA Feb. 1975 19 p refs Transl. into ENGLISH from J. Physiol. (France), v. 68, Mar. 1974 p 51-64
(Contract NASw-2481)
(NASA-TT-F-16194) Avail: NTIS HC $3.25 CSCL 06P

Heart rate (Fc), arterial blood flow (Q) by hand plethysmography, and variations in venous volume (delta V) were measured in man during muscular exercise of varying levels of exertion (W) from 30 to 180 W. During short-term exercise (5 to 8 minutes), blood flow and volume change in the same way: an initial decrease is followed by a progressive increase. Maximal delta V and minimal Q are not significantly linked with either W or Fc. These results show that the resistive and capacitive vessels of the hand, considered as representatives of cutaneous circulation, may be used as a flow and volume reserve at the beginning of exercise. However, due to the all or nothing type of the observed response it is not possible to attribute a precise regulating function to the cutaneous vessels.
Author

N75-17939# International Radiation Protection Association, Washington, D.C.
PROCEEDINGS OF THE THIRD INTERNATIONAL CONGRESS OF THE INTERNATIONAL RADIATION PROTECTION ASSOCIATION.
W. S. Snyder Feb. 1973 798 p refs In various languages Congress held at Washington, D. C., 9-14 Sep. 1973 Sponsored by AEC
(Conf-730907-P1) Avail: NTIS HC $17.25

Abstracts are presented for various papers included at the International Congress of the International Radiation Protection Association. Major topics discussed included the following: (1) radiation perspective in the U.S.; (2) radiation and man; (3) nonionizing radiation; (4) radiation effects on animals; (5) radioecology; (6) metabolism of uranium and transuranium elements; (7) dose calculations; (8) operational health physics.
NSA

N75-17940# Battelle Inst., Frankfurt am Main (West Germany).
DECONTAMINATION OF SURFACES CONTAMINATED BY CHEMICAL WARFARE AND THE DECONTAMINATION OF ORGANISMS PENETRATED BY CHEMICAL WARFARE [DEKONTAMINATION VON MIT CHEMISCHEN KAMPFSTOFFEN KONTAMINIERTEN OBERFLAECHEN UND DIE ENTGIFTUNG VON IN ORGANISMEN EINGEDRUNGENEN KAMPFSTOFFEN]
R. Reiner, U. Biehl, and I. Christensen Bonn Bundeswehramt 1974 88 p refs In GERMAN; ENGLISH summary Sponsored by Bundesmin. fuer Verteidigung
(BMVG-FBWT-74-6) Avail: NTIS HC $4.75; Bundeswehramt 30 DM

The decontaminating power of 50 compounds towards organofluoro phosphate compounds used in chemical warfare which had penetrated protective clothing, creams, and skin was assayed by determining the kinetics of nucleophylic attack and character of hydrophobic versus hydrophyle. Hydrophobic, nucleophile, negative group substituted oximes and polyoximes, polyhydroxamic acids, hydroguanidine, Schiff bases, hydroperoxides, and antrachinon sulfenic acid were synthesized and reaction rate with dipropylfluoro phosphate was tested with a fluoride sensitive electrode. Dissociation constants in acid solutions were also measured.
ESRO

N75-17941# Interuniversitair Reactor Instituut, Delft (Netherlands).
AN ATTEMPT TO BIOSYNTHESIZE Te123-

TELLUROMETHIONINE
Z. Kolar 1973 13 p refs Submitted for publication
(IRI-133-73-05) Avail: NTIS HC $3.25

A biosynthetic procedure is described to prepare labelled telluromethionine, similar to the procedure to obtain 75 Se-L-selenomethionine. The latter is widely used in nuclear medicine for the diagnostic visualization of the pancreas by scintigraphy, however it has the disadvantage of resulting in a high radiation dose. The biosynthetic procedure employed is based on the use of baker's yeast. Results indicate that the procedure cannot be applied for the preparation of significant amounts of labelled telluromethionine. Other mechanisms, rather than the incorporation of tellurium into amino acids and proteins, are responsible for the major part of the observed uptake of tellurium by growing yeast. ESRO

N75-17942# Naval Aerospace Medical Research Lab., Pensacola, Fla.
SOME EFFECTS OF ALCOHOL ON VARIOUS ASPECTS OF OCULOMOTOR CONTROL
Fred E. Guedry, Jr., Richard D. Gilson, David J. Schroeder, and William E. Collins 23 Aug. 1974 18 p refs
(MF51525004)
(AD-A000079; NAMRL-1206; USAARL-75-2) Avail: NTIS CSCL 06/16

Recent studies have shown that alcohol interferes with visual control of vestibular nystagmus. The present study was designed to assess three partially independent systems of oculomotor control. Performance on three Tasks was measured before and after mild alcohol dosage. One task involved visual suppression of vestibular nystagmus; a second involved smooth oculomotor tracking of a moving target; and a third required repetitive rapid voluntary shifts in gaze. Oculomotor control was degraded on the first two tasks with recovery toward the initial performance level 4 hours after drinking. Performance on the third task was not obviously degraded, although it is possible that improvement with practice was retarded. Results are discussed in terms of neurological systems involved and kinds of flight tasks potentially affected. Author (GRA)

N75-17943# National Academy of Engineering, Washington, D.C. Committee on the Interplay of Engineering with Biology and Medicine.
STUDY OF ENGINEERING IN MEDICINE AND HEALTH CARE
Jun. 1974 68 p refs
(Contract PH-43-64-44)
(PB-236883/5; ISBN-0-309-02148-0) Avail: NTIS MF $2.25; HC Avail National Academy of Sciences, Printing and Publishing Office, 2101 Constitution Ave., N. W. Washington, D. C. 20418 CSCL 06B

This is the final summary report which has studied and reported on the role of engineering in the development of medical and biological systems. The volume reports on several parallel studies in bioengineering in medicine. It examines the goals, limitations, and progress in applying technology to the problems of health care, considering such specific aspects of the field as technology transfer, sensory aids, clinical engineering, and government interaction with industry. The report also focuses on the role of the university in responding to health care needs through biomedical engineering. It also summarizes a study of biomedical engineering in foreign countries and present an appraisal of needs in biomaterials research and development. GRA

N75-17944# Pennsylvania Univ., Philadelphia.
EFFECTS OF MICROWAVES: LOCAL HOT SPOT HEATING BY MICROWAVES Final Report, 1 Jan. 1970 - 31 Dec. 1973
Herman P. Schwan 28 Oct. 1974 10 p
(Contract N00014-67-A-0216-0015)
(AD-A001558) Avail: NTIS CSCL 06/18

The report summarizes activities since January 1970. Activities in the laboratory include the following topics: Hot spot studies; field force effects; and biophysical and other principles. GRA

N75-17945# Ohio State Univ. Research Foundation, Columbus
CARDIOVASCULAR, RENAL AND RESPIRATORY EFFECTS OF HIGH INTENSITY, INTERMEDIATE DURATION, LOW FREQUENCY VIBRATION Interim Report, 1 Jul. 1973 - 31 May 1974
Robert M. Nerem, Robert L. Hamlin, and William D. Schwerin 18 Jul. 1974 34 p refs
(Grant AF-AFOSR-2526-73; OSURF Proj. 3656)
(AD-A000042; OSURF-3656-1; AFOSR-74-1607TR) Avail: NTIS CSCL 06/19

A research program on the influence of high intensity, intermediate duration, low frequency wholebody vibration on the cardiovascular, renal, and respiratory systems has been initiated. During the period June 1, 1973 to May 31, 1974, the major emphasis was on the study of the transport of albumin between blood and the arterial wall. Using 131 I-albumin, a series of in vivo experiments have been carried out at a frequency of 10 Hz and a half-amplitude of 0.635 cm as well as at control conditions. These data indicate an enhancement of albumin uptake in the dog aorta in the presence of vibration and are consistent with the concept of a shear dependent transport process. Measurements of aortic pressure and velocity waveforms and, regional blood flow distribution, have also been carried out. Initial results are presented although these experiments are still in progress. Author (GRA)

N75-17946# School of Aerospace Medicine, Brooks AFB, Tex.
RETINAL SUBTHRESHOLD LASER EXPOSURES: CUMULATIVE EFFECT Final Report, Jan. 1973 - Jan. 1974
James T. Gallagher and William F. MacKenzie Sep. 1974 17 p refs
(AF Proj. 6301)
(AD-A000808; SAM-TR-74-39) Avail: NTIS CSCL 06/18

The possibility of cumulative effect from visible laser radiation was investigated by two methods: Testing for a change in the apparent ED50 after a series of previous subthreshold exposures; histologically examining retinal tissue subjected to various series of subthreshold exposure. Neither method indicated a cumulative effect with a 30-sec interval between doses. Author (GRA)

N75-17947*# Scientific Translation Service, Santa Barbara, Calif.
ESSAYS ON THE PSYCHOLOGY OF OPERATOR LABOR
Ye. A. Mileryan, ed. Washington NASA Jan. 1975 375 p refs Transl. into ENGLISH of the book "Ocherki Psykhologii Truda Operatora" Moscow, Nauka Press, 1974 p 1-309
(Contract NASw-2483)
(NASA-TT-F-16020) Avail: NTIS HC $10.00 CSCL 05J

Psychological factors of operator performance in man machine systems design considerations.

N75-17948* Scientific Translation Service, Santa Barbara, Calif.
EMOTIONAL-VOLITIONAL COMPONENTS OF OPERATOR RELIABILITY
Ye. A. Mileryan *In its* Essays on the Psychology of Operator Labor (NASA-TT-F-16020) Jan. 1975 p 3-99 refs Transl. into ENGLISH from the book "Ocherki Psykhologii Truda Operatora" Moscow, Nauka Press, 1974 p 5-82

CSCL 05J

Sensorimotor function testing in a tracking task under stressfull working conditions established a psychological characterization for a successful aviation pilot: Motivation significantly increased the reliability and effectiveness of their work. Their acitivities were aimed at suppressing weariness and the feeling of fear caused by the stress factors; they showed patience, endurance, persistance, and a capacity for lengthy volitional efforts. G.G.

N75-17949* Scientific Translation Service, Santa Barbara, Calif.
DISCUSSION AND THEORETICAL SUMMARIZATION OF THE EXPERIMENTAL DATA
Ye. A. Mileryan *In its* Essays on the Psychology of Operator Labor (NASA-TT-F-16020) Jan. 1975 p 100-143 refs Transl. into ENGLISH from the book "Ocherki Psykhologii Truda Operatora" Moscow, Nauka Press, 1974 p 83-119

CSCL 05J

A summary of research on psychological factors that cause substantial changes in the reliability indicators of an operators work is followed by a conclusion that strong moral-volitional qualities are the basic factors that make the human behavior under conditions of stress effective; emotional subcortical subdominants affect a person's conscious organization and self control in a man machine environment. G.G.

N75-17950* Scientific Translation Service, Santa Barbara, Calif.
ON THE EFFECT OF EMOTIONAL STATES ON OPERATOR THINKING
A. V. Solodkova *In its* Essays on the Psychology of Operator Labor (NASA-TT-F-16020) Jan. 1975 p 143-166 refs Transl. into ENGLISH from the book "Ocherki Psykhologii Truda Operatora" Moscow, Nauka Press, 1974 p 119-137

CSCL 05J

A combination sonic and electrical skin stimuli stress test is reported that is suitable for the psychological selection of individuals to perform operator functions. The behavior of these people is characterized by a fighting spirit, increased work capacity, minimum expenditure of strength and insignificant fatigue. G.G.

N75-17951* Scientific Translation Service, Santa Barbara, Calif.
THE OPERATOR'S EMOTIONAL STABILITY
P. B. Zilberman *In its* Essays on the Psychology of Operator Labor (NASA-TT-F-16020) Jan. 1975 p 167-208 refs Transl. into ENGLISH from the book "Ocherki Psykhologii Truda Operatora" Moscow, Nauka Press, 1974 p 139-172

CSCL 05J

An attempt is made to provide a psychological interpretation of the concept of emotional stability in connection with other psychics qualities of an operator's personality. Emotional stability is understood as a person's capacity to control his emotional state for the purpose of maintaining the necessary level of work performance under extreme stress conditions. By modeling the operator's sensorimotor activity and by comparing the productivity indicators under ordinary conditions with those obtained during work involving an emotional load, the level of emotional stability can be determined. G.G.

N75-17952* Scientific Translation Service, Santa Barbara, Calif.
INCREASING THE RELIABILITY OF LABOR OF RAILROAD ENGINEERS
V. S. Genes and Yu. M. Madiyevskiy *In its* Essays on the Psychology of Operator Labor (NASA-TT-F-16020) Jan. 1975 p 209-225 Transl. into ENGLISH from the book "Ocherki Psykhologii Truda Operatora" Moscow, Nauka Press, 1974 p 173-185
CSCL 05J

It has been shown that the group of problems related to temporary overloads still require serious development with respect to further automating the basic control operation - programmed selection of speed and braking. The problem of systems for warning the engineer about the condition of the unseen track segments remains a very serious one. Systems of hygenic support of the engineer also require constructive development. The problems of ensuring the reliability of work of engineers in periods of low information load, requiring motor acts, can basically be considered theoretically solved. Author

N75-17953* Scientific Translation Service, Santa Barbara, Calif.
OPERATIONAL CALM AND THE OPTIMUM REGULATION OF HUMAN WORKING CAPACITY
Ye. P. Ilin *In its* Essays on the Psychology of Operator Labor (NASA-TT-F-16020) Jan. 1975 p 226-251 refs Transl. into ENGLISH from the book "Ocherki Psykhologii Truda Operatora" Moscow, Nauka Press, 1974 p 186-206

CSCL 05J

Muscle hardness measurements in a squeezing dynamometer test are interpreted for expressions of adjustment effects of the central nervous system in rapid response to a starting signal. It is shown that preliminary muscle tension leads to the transmission of inhibiting proprioceptive impulses to the nervous system centers and that the degree of pre-working changes depends on the individual's typological personality characteristics. Concentration of attention during the pre-working adjustment is considered the primary emotional factor that controls sensorimotor performance. G.G.

N75-17954* Scientific Translation Service, Santa Barbara, Calif.
ATTENTION AND ITS ROLE IN THE OPERATOR'S WORK
O. P. Shvetsov *In its* Essays on the Psychology of Operator Labor (NASA-TT-F-16020) Jan. 1975 p 252-280 refs Transl. into ENGLISH from the book "Ocherki Psykhologii Truda Operatora" Moscow, Nauka Press, 1974 p 207-230

CSCL 05J

A complex attentiometer investigation of the distribution, redirection, and concentration of attention during an operator's work notes the following stages: (1) General attentiveness is still not adequately expressed in the beginning; and (2) operator self-control of actions develops and gradually decreases errors in redirecting and distributing attention. A definite relationship is found between the improvement of concentration, distribution and redirection of attention and automation of sensorimotor performance. Excercises prove less effective in redirection of attention. G.G.

N75-17955* Scientific Translation Service, Santa Barbara, Calif.
VERBALIZATION AND IMAGERY IN THE PROCESS OF FORMATION OF OPERATOR LABOR SKILLS
V. V. Mistyuk *In its* Essays on the Psychology of Operator Labor (NASA-TT-F-16020) Jan. 1975 p 281-302 refs Transl. into ENGLISH from the book "Ocherki Psykhologii Truda Operatora" Moscow, Nauka Press, 1974 p 231-249

CSCL 05J

Sensorimotor control tests show that mastering operational skills occurs under conditions that stimulate the operator to independent active analysis and summarization of current information with the goal of clarifying the signs and the integral images that are a model of the situation. Goal directed determination of such an image requires inner and external speech, activates and improves the thinking of the operator, accelerates the training process, increases its effectiveness, and enables the formation of strategies in anticipating the course of events. Author

N75-17956* Scientific Translation Service, Santa Barbara, Calif.
CERTAIN ASPECTS OF THE PSYCHOLOGICAL ANALYSIS OF PROGRAMMER ACTIVITY
V. M. Bondarovskaya *In its* Essays on the Psychology of Operator Labor (NASA-TT-F-16020) Jan. 1975 p 303-334 refs Transl. into ENGLISH from the book "Ocherki Psykhologii Truda Operatora" Moscow, Nauka Press, 1974 p 250-275

CSCL 05J

The psychological analysis of programmer activity showed that one of its basic characteristics is the need to employ formal languages. In determining ways of effectively mastering the capacity to write algorithms in the algorithmic language, it is expedient to proceed from its similarity to the living languages and the language of mathematical formulas, and to choose certain psychological principles of mastering foreign languages and mathematical symbols in teaching the algorithmic language. General models of the input language significantly increase the effectiveness of its mastery and permit the development of thinking on the part of the students. Author

N75-17957* Scientific Translation Service, Santa Barbara, Calif.
THE REACTION OF THE CARDIO-VASCULAR AND SYMPATHICO-ADRENAL SYSTEMS TO INTELLECTUAL ACTIVITY WITH EMOTIONAL STRESS
L. I. Tomashevskaya *In its* Essays on the Psychology of Operator Labor (NASA-TT-F-16020) Jan. 1975 p 335-351 refs Transl. into ENGLISH from the book "Ocherki Psykhologii Truda

Operatora" Moscow, Nauka Press, 1974 p 275-290

CSCL 05J

The effect of emotiogenic factors on an operator's intellectual activity were studied for differing working regimes on an experimental control panel that provided for light, sonic, and electrocutaneous stimuli. The latter stimulus was activated automatically if the subject gave an incorrect response. It was shown that the working capacity of the operator under stress depends to a great extent on the effect of the emotiogenic factors on the individual functioning characteristics of the cardiovascular and sympathetic-adrenal systems. Moral, intellectual, willpower, emotional, and other personality traits are decisive factors of operator function. G.G.

N75-17958* Scientific Translation Service, Santa Barbara, Calif.
THE PSYCHOLOGICAL CERTIFICATE OF THE COMPUTER
Ye. A. Mileryan *In its* Essays on the Psychology of Operator Labor (NASA-TT-F-16020) Jan. 1975 p 352-372 ref Transl. into ENGLISH from the book "Ocherki Psykhologii Truda Operatora" Moscow, Nauka Press, 1974 p 290-307

CSCL 05J

A systems structural approach is reported to study the operator for a computerized man machine system psychologically in order to obtain relative estimates for his performance in the particular system he serves. Considered are the reliability of sensorimotor control functions for the reconstructed system and its indices according to the level of effectiveness of the operator's accomplishment of intellectual operations. G.G.

N75-17959# Army Cold Regions Research and Engineering Lab., Hanover, N.H.
COLD REGIONS HABITABILITY: A SELECTED BIBLIOGRAPHY
C. Burgess Ledbetter Sep. 1974 30 p
(DA Proj. 4A1-62121-A-894)
(AD-A000692; CRREL-SR-211) Avail: NTIS CSCL 05/5

The effects on people of isolation and confinement in man-made structures in cold regions, commonly termed cabin fever, also occur in other environments, such as spacecraft, underwater vessels, and elements of the urban environments such as hospitals and prisons. Habitation characteristics of cold regions are discussed and literature dealing with a variety of types of isolation and confinement environments is segregated into topical areas. Author (GRA)

N75-17960# Naval Postgraduate School, Monterey, Calif.
AN INVESTIGATION OF BIORHYTHMIC INFLUENCE UPON HUMAN PERFORMANCE M.S. Thesis
John Edward Mosier Sep. 1974 39 p refs
(AD-A001266) Avail: NTIS CSCL 06/16

The research attempted to define the relationship between actual performance and the state of the biorhythm. Seven subjects performed two physical tasks, one measuring gripping force and the other measuring time-on-target. Performance was compared to each of the individual biorhythm cycles and also to various combinations of the cycles. The results suggested that some functional relationship may exist. Evidence was presented supporting the concept of relativity in biorhythmic influence among individuals. GRA

N75-17961# Naval Postgraduate School, Monterey, Calif.
PILOT ACCIDENT POTENTIAL AS RELATED TO TOTAL FLIGHT EXPERIENCE AND RECENCY AND FREQUENCY OF FLYING M.S. Thesis
Henry Benjamin Myers, Jr. Sep. 1974 79 p refs
(AD-A001256) Avail: NTIS CSCL 05/9

The thesis introduces exploratory data analysis methods into the question of categorizing pilots and relating these categories to accident potential. The usually recorded flight data deal with the pilots' total flight experience, recency, and frequency of flying. The purpose of categorizing is to determine if the recorded flight data could help discriminate between two original sample groups of fifty pilots each, those pilots with accidents during FY73 and those without. The technique of linear discriminant analysis indicated that there is significant difference in the mean vectors of flight data for the two groups. (Modified author abstract) GRA

N75-17962# Aeronautical Systems Div., Wright-Patterson AFB, Ohio.
THE HUMAN PILOT AS A DYNAMIC ELEMENT IN AIRCRAFT CONTROL SYSTEMS Final Report
Thomas B. Willen Apr. 1974 44 p refs
(AD-A001622; ASD-TR-73-47) Avail: NTIS CSCL 01/3

A great deal of research has been devoted to the development of a human pilot describing function model for single axis compensatory tracking tasks and as a result the model has shown good repeatability in predicting pilot behavior. The extension of the single axis model to the more pragmatic multiloop control situation is somewhat tentative at present but does not seem to be an unreasonable extrapolation. Application of the pilot model to the development of a flexible and objective handling qualities theory holds real promise; however, further definition of the subjective pilot opinion rating - pilot model parameter link is required. A beneficial approach along these lines would be flight testing for pilot behavior characteristics in all new or existing aircraft weapons systems. An alternate approach to the pilot modeling is the sampled-data model and certain control situations warrant its use. The sample remnant model discussed may provide a suitable matching of approaches with more research. GRA

N75-17963# Office of the Chief of Research Development and Acquisition (Army), Washington, D.C.
PROCEEDINGS OF CONFERENCE ON AIRCREW PERFORMANCE IN ARMY AVIATION Final Report
Jul. 1974 205 p refs Held at Fort Rucker, Ala., 27-29 Nov. 1973
(AD-A001539) Avail: NTIS CSCL 01/2

The purpose of the conference was to explore the behavioral problems affecting pilots of Army helicopters, with special emphasis on Nap-of-the-Earth (NOE) flight. The technical papers included in this Proceedings deal with the nature of the future combat environment, next generation helicopters, cockpit configuration, map aids, avionics systems, night vision devices, training and simulation requirements and measurement criteria. Included also is a recommended behavioral research program to support Army Aviation. GRA

N75-17964# New Mexico State Univ., University Park. Dept. of Psychology.
QUANTITATIVE MODELS FOR PREDICTING HUMAN VISUAL/PERCEPTUAL/MOTOR PERFORMANCE Final Report
Warren H. Teichner Oct. 1974 47 p refs
(Contract N00014-70-A-0147-0002; NR Proj. 197-013)
(AD-A001072; NMSU-ONR-TR-74-3) Avail: NTIS CSCL 05/10

The report provides an integration of the work performed under the contract along with related developments in the field. The report begins with a general definition of a task. It then develops a theoretical approach for the prediction and evaluation of task performance. Following that, specific task definitions are derived from the theory and the manner of their application explained. GRA

N75-17965*# Telecare Inc., Houston, Tex.
ADVANCED LIFE SYSTEMS HARDWARE DEVELOPMENT FOR FUTURE MISSIONS Final Report
Jan. 1975 65 p refs
(Contract NAS9-13603)
(NASA-CR-141625) Avail: NTIS CSCL 06K

An examination of the pulse formation in an externalized vessel suggests that the vessel does not behave as a simple visco-elastic tube. Pressure-pulse waveform transducers are sensitive either to the pressure present at the vessel wall or to the volume of blood filling a region of tissue. Results of comparisons between intra-and extra-vascular pressure recordings

suggest that changes in vasomotor tone and transducer-vessel pressures may be the greatest contributors to the divergence of extra-vascular waveforms from intra-vascular waveforms. M.C.F.

N75-17966*# McDonnell-Douglas Astronautics Co., Houston, Tex.
CREW PROCEDURES DEVELOPMENT TECHNIQUES Final Report
J. D. Arbet, R. L. Benbow, M. L. Hawk, A. A. Mangiaracina, J. L. McGavern, and M. C. Spangler 3 Jan. 1975 41 p refs
(Contract NAS9-13660)
(NASA-CR-141592; MDC-E1196) Avail: NTIS HC $3.75 CSCL 05E

The study developed requirements, designed, developed, checked out and demonstrated the Procedures Generation Program (PGP). The PGP is a digital computer program which provides a computerized means of developing flight crew procedures based on crew action in the shuttle procedures simulator. In addition, it provides a real time display of procedures, difference procedures, performance data and performance evaluation data. Reconstruction of displays is possible post-run. Data may be copied, stored on magnetic tape and transferred to the document processor for editing and documentation distribution. Author

N75-17967*# URS/Matrix Co., Houston, Tex. Life and Environmental Sciences Div.
DEVELOPMENT OF AN EVA SYSTEMS COST MODEL VOLUME 1: DESIGN GUIDES SYNOPSIS-EVA EQUIPMENT Final Report
Jul. 1974 219 p refs
(Contract NAS9-13790)
(NASA-CR-141634) Avail: NTIS HC $7.25 CSCL 06K

EVA equipment design guides and crewman interfaces are provided. A summary presents data on suited crewman mobility capabilities and on off-the-shelf Skylab hardware for economy planning. Author

N75-17968# Civil Aeromedical Inst., Oklahoma City, Okla.
EAR-PROTECTOR RATINGS
Jerry V. Tobias and F. Michael Irons Dec. 1973 19 p refs
(AD-779552; FAA-AM-73-20) Avail: NTIS HC $3.00

Ear protectors, including custom-molded, wearer-molded, and pre-molded types, were evaluated according to American-standard procedures. Earplugs are described and are listed in the order of their low-frequency (below 1000 Hz) attenuation. Author

N75-17969*# Walden Research Corp., Cambridge, Mass.
CONTAMINANT REMOVAL FROM ENCLOSED ATMOSPHERES BY REGENERABLE ADSORBENTS Final Report
Robert L. Goldsmith, Kenneth J. McNulty, Gerald M. Freedland, Amos Turk (City Coll. of the City of New York), and Jerry Nwankwo (City Coll. of the City of New York) 15 May 1974 91 p refs
(Contract NAS2-7896)
(NASA-CR-137626) Avail: NTIS HC $4.75 CSCL 06K

A system for removing contaminants from spacecraft atmospheres was studied, which utilizes catalyst-impregnated activated carbon followed by in-situ regeneration by low-temperature catalytic oxidation of the adsorbed contaminants. Platinum was deposited on activated carbon by liquid phase impregnation with chloroplatinic acid, followed by drying and high-temperature reduction. Results were obtained for the seven selected spacecraft contaminants by means of three experimental test systems. The results indicate that the contaminants could be removed by oxidation with very little loss in adsorptive capacity. The advantages of a catalyst-impregnated carbon for oxidative regeneration are found to be significant enough to warrent its use. Author

N75-17970# Ben Gurion Univ. of the Negev, Beersheva (Israel). Dept. of Mechanical Engineering.
A SIMULATION OF AN AIRCRAFT'S ENVIRONMENTAL CONTROL SYSTEM
Yaacov Eichler 7 Mar. 1974 30 p refs Backup document for AIAA Synoptic, "A Simulation Study of an Aircraft's Environment Control System Dynamic Response", scheduled for publication in the Journal of Aircraft in Aug. 1975
Avail: NTIS HC $3.75

A simulation was made of the environmental control system (ECS) of a high performance aircraft. The ECS provides temperature control for the cockpit and avionics equipment bays throughout the flight performance envelope of the aircraft. This is achieved by bleeding hot air from the engine, cooling part of it and mixing the hot and cold flows. The sensors, controller and valves of the system were modelled as well as the heat exchangers and expansion turbine. Dynamic response was compared to specifications and sensitivity of performance to system parameters was measured. A partial evaluation of the simulation was achieved by using some available laboratory test results and comparing these with simulation results for the same conditions. Author

N75-17971*# Life Systems, Inc., Cleveland, Ohio.
HYDROGEN DETECTION STUDY Final Report, 1 Jan. 30 Sep. 1974
J. W. Shumar and J. D. Powell Sep. 1974 49 p refs
(Contract NAS2-6478)
(NASA-CR-137563; LSI-ER-170-85) Avail: NTIS HC $3.75 CSCL 06K

The effectiveness was assessed of a hydrogen (H2) detection concept for regenerative environmental control life support systems (EC/LSS). The concept evaluated was that utilized for the electrochemical depolarized concentrator (EDC) design, constructed, and tested for the EC/LSS space station prototype program. The EDC contains combustible gas detectors (CGDs) which were evaluated with H2. The CGDs were evaluated for linearity, position sensitivity, reproducibility, ambient effects, repeatability, speed of response, recovery time, and interchangeability. The effectiveness of CGDs located within the EDC for sensing H2 leaks at various line replaceable units in the subsystem was determined. The effects of H2 leak rate, H2 concentration of leaking gas and air currents in the vicinity of the EDC were determined. Proposed improvements for the H2 detection concept were documented and alternative H2 detection approaches were identified and analyzed. Author

N75-17972*# Acurex Corp., Mountain View, Calif.
PHASE 2, 3 AND 4 8 psi PRESSURE GLOVE Final Report
William Elkins Jan. 1975 76 p
(Contract NAS2-7610)
(NASA-CR-114755; Rept-74-104) Avail: NTIS HC $4.75 CSCL 06K

The feasibility of providing a high pressure, very mobile and reliable space suit glove system is demonstrated. A 'soft' toroidal wrist joint assembly was developed. A representative Kevlar and steel wrist section was tested and proved the useful lifetime to be in excess of 1,000,000 cycles. Improved comfort was accomplished by increasing the first finger metacarpal dimensions. Recommendations concern design refinements, and EVA configuration. Author

N75-17973# Flying Personnel Research Committee, London (England).
EVALUATION OF AIRCREW PROTECTIVE HELMETS WORN DURING CRASHES AND EJECTIONS
D. H. Glaister May 1974 37 p refs Revised
(AD-A000632; FPRC-1330-Rev) Avail: NTIS CSCL 06/17

A method is described for evaluating the impact history of aircrew protective helmets. Of 30 helmets randomly selected it was concluded that 40% had contributed to a reduction in head injury and had probably been life saving. There was a reasonable correlation between estimated impact energy and head injury, but that between estimated transmitted force and head injury was less satisfactory, presumably due to the non-representative dynamic behaviour of current headforms. Author (GRA)

N75-17974# Whittaker Corp., Waltham, Mass. Space Sciences Div.
DEVELOPMENT OF AN IMPLANTABLE OXYGEN SENSOR. IN VITRO VALIDATION OF THE FUEL CELL OXYGEN SENSOR IN REAL AND SIMULATED BODY FLUIDS Annual Report, Jun. 1973 - Jun. 1974
Kuo wei Chang and Sol Aisenberg Jun. 1974 61 p refs
(Contract N01-HL-3-3033-R)
(PB-237373/6; SSD-P-708-AR-1) Avail: NTIS HC $4.25 CSCL 06B

An implantable oxygen sensor for continuous measurement of blood oxygen tension was devised which is a specially designed glucose fuel cell operating in the oxygen-diffusion limited mode where the short circuit current is directly proportional to the dissolved oxygen concentration of the surrounding fluid. In vitro measurements in glucose containing Krebs-Ringer solutions and in bovine serum show that the sensor is linear, accurate, stable, and fast responding. Two prototype sensors were described, one being composed of porous electrodes and the other of wire cathode and porous anode. Both prototype sensors were miniaturized and are ready for trial in animals. GRA

N75-17975# McDonnell-Douglas Corp., Huntington Beach, Calif.
REVERSE OSMOSIS FOR SPACECRAFT WASH WATER RECYCLING MEMBRANE COUPON AND MODULE EVALUATIONS Progress Report
G. W. Wells and R. E. Shook Jul. 1974 169 p refs
(Contract DI-14-30-3062)
(PB-236941/1; INT-OSW-RDPR-74-994) Avail: NTIS HC $6.25 CSCL 07A

The investigation and evaluation of reverse osmosis membrane coupons are presented, and the testing of an 80 gallon per day blend cellulose di- and tri-acetate spiral wound module for spacecraft wash water recycling is discussed. Tests were conducted on five membrane materials using a 165F simulated spacecraft wash water solution feed at first 800 and then 500 psig. The five membrane materials tested were: composite coated polysulfone film, cellulose acetate composite, sulfonated polysulfone, ethyl cellulose, and plasma polymerized amine polysulfone. GRA

N75-18871 Cornell Univ., Ithaca, N.Y.
EFFECTS OF MAGNETISM BAROMETRIC PRESSURE, AND POLARIZED LIGHT ON THE HOMING PIGEON Ph.D. Thesis
Melvin Louis Kreithen 1974 112 p
Avail: Univ. Microfilms Order No. 74-29923

Homing pigeons from the Cornell research lofts were tested in the laboratory for their ability to respond to magnetic fields, barometric pressure, and polarized light. The response in all tests was a classically conditioned increase in heart rate.
Dissert. Abstr.

N75-18872 Wisconsin Univ., Madison.
VENTILATORY ACCLIMATIZATION OF THE PONY AT 4300 METERS ALTITUDE Ph.D. Thesis
James Anthony Orr 1974 91 p
Avail: Univ. Microfilms Order No. 74-19933

Studies were designed to determine if severe hypoxia would cause increases in CSF H(+) during chronic hypoxia. Acid-base data of arterial blood and CSF were measured on seven grade ponies at sea level and during a 9 say sojourn at 4300 m. Data included P(CO2), pH and P(O2) of arterial blood and P(CO2) and pH of CSF. All acid-base and P(O2) measurements were made by means of appropriately calibrated microelectrodes. The ponies were studied at Madison, Wisconsin (PB = 740 mm Hg) and after selected times at Mt. Evans, Colorado (PB = 450 mm Hg). Expired minute volume and respiratory rate were measured while the animals breathed ambient air at sea level and after 1 hr, 6 hrs, 2 days and 8 days at 4300 m.
Dissert. Abstr.

N75-18873 Wyoming Univ., Laramie.
A REPEATER TYPE BIOTELEMETRY SYSTEM FOR USE ON WILD BIG GAME ANIMALS Ph.D. Thesis
Jerry Joseph Cupal 1974 149 p
Avail: Univ. Microfilms Order No. 75-210

A repeater system was developed with which an internal body parameter can be monitored remotely. Basically, this system consisted of three major pieces of equipment: (1) a heat flow rate monitoring implanted transmitter; (2) a repeater type neck collar, consisting of a receiver and a retransmitter; and (3) a receiving and decoding system at the observer end of the data transmission link for display of the biological data. Data were transmitted in a form of pulse interval modulation which minimized current drain by decreasing the duty cycle of the transmitters. The carrier frequency of the data link between the implant and the neck collar repeater was 575 KHz. Between the neck collar repeater and the receiving and decoding system, data were transmitted at 172 MHz. Animal motion was sensed in the neck collar repeater and data on this parameter was transmitted at this frequency. Dissert. Abstr.

N75-18874*# Pennsylvania Univ., Philadelphia. Plant Centrifuge Lab.
EFFECTS OF INCREASED G-FORCE ON THE NUTATIONS OF SUNFLOWER SEEDLINGS
A. H. Brown, D. K. Chapman, and A. O. Dahl 14 Mar. 1975 26 p refs
(Grants NGR-39-010-149; NGR-39-030-019)
(NASA-CR-142184; NUTFOG-1) Avail: NTIS HC $3.75 CSCL 02D

A centrifuge was used to provide chronic acceleration in order to study the nutation of six-day old sunflower hypocotyls at 1 to 20 times normal gravity (g). At the upper end of the g-range nutational movement was impeded and at times erratic evidently because the weight of the cotyledons exceeded the supportive abilities of the hypocotyls. Over the range from 1 to 9 g the period of nutation was independent of the resultant g-force. That finding is interpreted as evidence that the geotropic response time -- i.e., the time needed for growth hormone transport from the region of g-sensing to the region of bending response --was not influenced significantly by substantial increments of the g-level, since geotropic response time is related to the period of nutation. Author

N75-18875*# Houston Univ., Tex. Dept. of Biology.
SPERMATOGENESIS, THE MATURE SPERM, AND SPERM EGG ASSOCIATION IN NEMATOSPIROIDES DUBIUS Final Report, 15 Mar. 1973 - 15 Feb. 1974
Wallis H. Clark, Jr. 15 Feb. 1974 81 p refs
(Contract NAS9-13306)
(NASA-CR-141691) Avail: NTIS HC $4.75 CSCL 06C

Nematode spermatogenesis was investigated using the strongyloid Nematospiroides dubius. The primary spermatocytes, development of spermatids, and changes in the sperm in the female tract are described. F.O.S.

N75-18876*# Pennsylvania Univ., Philadelphia. Plant Centrifuge Lab.
EFFECTS OF VERTICAL ROTATION ON ARABIDOPSIS DEVELOPMENT
A. H. Brown, D. K. Chapman, and A. O. Dahl 14 Mar. 1975 21 p refs
(Grants NGR-39-010-149; NGR-39-030-010)
(NASA-CR-142246; VERTRO-1) Avail: NTIS HC $3.25 CSCL 06C

Various gross morphological end points of Arabidopsis development are examined in an attempt to separate the effects of growth on the horizontal clinostat into a component caused by rotation alone and another component caused by the altered position with respect to the direction of the g-vector. In a series of tests which involved comparisons between vertical stationary plants, vertical rotated plants, and plants rotated on clinostats, certain characters were consistently influenced by vertical rotation alone. The characters for which this effect was statistically significant were petiole length and leaf blade width. Author

N75-18877*# Food and Drug Administration, Cincinnati, Ohio.
ECOLOGY AND THERMAL INACTIVATION OF MICROBES

IN AND ON INTERPLANETARY SPACE VEHICLE COMPONENTS Quarterly Progress Report, 1 Jul. - 30 Sep. 1974
A. L. Reyes 30 Sep. 1974 21 p refs
(NASA Order W-13411)
(NASA-CR-142296; QPR-38) Avail: NTIS CSCL 06M

Dry heat inactivation characteristics were compared for 4-6 (B. brevis) spores and microbes from the Cincinnati soil samples at 105, 112, and 125. Characterized were the survival curves of 4-6 (B. brevis) spores at 112, 115, 118, 120, and 125 C, and 1.2 microgram of water per ml of headspace air (closed tin-can system), and the morphological characteristics of 4-6 (B. brevis), 6-12 (B. lentus), 7-11 (B. coagulans), and B. subtilis var. niger spores by scanning electron microscopy. Author

N75-18879 Houston Univ., Tex.
POWER SPECTRAL DENSITY ANALYSIS OF THE ELECTROMYOGRAM FROM A WORK TASK PERFORMED IN A FULL PRESSURE SUIT Ph.D. Thesis
Earl Vernon Lafevers 1974 82 p
Avail: Univ. Microfilms Order No. 75-1033

The power spectral density analysis of EMG recordings from the bicep brachii, middle deltoideus, and upper trapezius of the right torso from four subjects performing a push-pull task at various reach positions in the right reach envelope in a space suit and in shirtsleeves revealed reliable differences between muscles in fatigue-induced responses to individual reach positions, and a differential sensitivity in responses of individual muscles to the various reach positions in the reach envelope. In the pressurized space suit, the bicep brachii was most affected by the encumbrance. Considering the differences in EMG power between the space suited condition and the shirtsleeve baseline, and bicep brachii registered an increase in power in both the 10-31 hertz band and 61-93 hertz band at all seven reach positions as a result of 1-1/2 minutes of work. Dissert. Abstr.

N75-18880 Washington Univ., Seattle.
A DIGITAL COMPUTER MODEL OF CIRCULATORY TRANSPORT AND DELIVERY DYNAMICS IN MAN Ph.D. Thesis
Yi-Sung Chen 1974 136 p
Avail: Univ. Microfilms Order No. 74-29389

A dynamic computer model of whole-body oxygen transport is presented. The model was approached using lumped-distributed parameter approximations. Compartmental theory was used for formulating the elements of the circulation model. Development of the model was done on the CDC-6400 digital computer using simulation language, MIMIC. The oxygen transport model was used in the evaluation of hemodynamic responses to exercise of five groups of healthy men of different ages and in different postures, and two groups of patients with coronary disease, either with prior myocardial infraction or angina pectoris. In all cases, it was able to predict, quantitatively within reasonably narrow limits, the mixed venous oxygen content and oxygen utilization coefficient. Dissert. Abstr.

N75-18881 Columbia Univ., New York.
DIELECTRIC AND PIEZOELECTRIC PROPERTIES OF BONE AS FUNCTIONS OF MOISTURE CONTENT Ph.D. Thesis
Gloria Brooks Reinish 1974 189 p
Avail: Univ. Microfilms Order No. 74-28526

Dry bone had previously been shown to be piezoelectric in the classic sense, that is, mechanical stress produces polarization (direct effect) and application of electric field produces strain (converse effect). Moisture content of bone, as a function of humidity, exhibits considerable hysteresis, as well as very long time constants. Since electrical properties are functions of moisture content, careful control of moisture content is needed for unambiguous results. It was also shown that dielectric properties of wet bone can be modeled in terms of a heterogeneous dielectric with a broad spectrum of relaxation times, and piezoelectric properties have been shown to follow classic piezoelectric behavior over the entire range of humidities studied, zero to 100%, with a moderate reduction in piezoelectric coefficients as moisture content increases. Dissert. Abstr.

N75-18882*# Lovelace Foundation for Medical Education and Research, Albuquerque, N.Mex. Dept. of Physiology.
RESEARCH REPORT ON: SPECIALIZED PHYSIOLOGICAL STUDIES IN SUPPORT OF MANNED SPACE FLIGHT Annual Research Report, 1 Jan. - 31 Dec. 1974
U. C. Luft Feb. 1975 64 p refs
(Contract NAS9-12572)
(NASA-CR-141698) Avail: NTIS HC $4.25 CSCL 06P

An investigation of the role of 02 fluctuations in oxygen uptake observed with changing posture is reported. A comparison of the closing volume test with other pulmonary function measurements is presented along with a comparison of hydrostatic weighing, and a stereophotogrammetric method for determining body volume. F.O.S.

N75-18883# Army Aeromedical Research Lab., Fort Rucker, Ala.
[SENSORY PERCEPTION STUDIES OF SOLDIER'S MILITARY PERFORMANCE, EMPHASIZING FLIGHT STRESSES AND CONDITIONS] Annual Progress Report, 1 Jul. 1973 - 30 Jun. 1974
Robert W. Bailey Jul. 1974 110 p refs
(AD-A000800) Avail: NTIS CSCL 06/5

Contents: Direct field research support to immediate army aeromedical problems; Medical research applied to the problems in Army aviation; Research of visual problems medically significant to Army aviation; Research of psychoacoustical problems medically significant to Army aviation; Research psychology applied to medically significant problems in Army aviation; Research of bioengineering problems medically significant to Army aviation. Simulated in-flight monitoring systems (SIMUHIMS). GRA

N75-18884# McDonnell-Douglas Astronautics Co., Richland, Wash. Donald W. Douglas Labs.
IMPLANTED ENERGY CONVERSION SYSTEM Annual Report, 8 Jul. 1973 - 22 Jul. 1974
R. P. Johnston, W. R. Griffith, R. E. Perrone, W. R. Martini, and S. G. Emigh Aug. 1974 209 p refs
(Contract N01-HT-4-2901)
(PB-237558/2; MDC-G4441; NIH/NHLI-N01-HV-4-2901-1)
Avail: NTIS HC $7.25 CSCL 06L

Radioisotope or stored thermal heat energy operates a Stirling engine module to produce hydraulic power. The hydraulic powered pump actuator module operates and controls either an assist or a fuel heart blood pump. The hydraulic fluid also transmits waste heat from the engine to the blood pump ventricles for dissipation to the body. A full system has operated an assist blood pump in vivo for 175 hours continuously and in vitro for 842 hours continuously and was terminated without failure. The current implantable system can pump 12 liters/minute of blood with 50 watts input. GRA

N75-18885# Naval Postgraduate School, Monterey, Calif.
ESTIMATION OF THE PHYSIOLOGICAL PARAMETERS OF HEART-RATE AND OXYGEN-CONSUMPTION DURING HEAT AND WORK STRESS M.S. Thesis
Recep Mercankay Sep. 1974 37 p refs
(AD-A001285) Avail: NTIS CSCL 06/19

The current research represents an attempt to formulate a mathematical model of the physiological parameters of heart-rate and oxygen consumption under varying heat levels and workloads. Stepwise multiple regression was performed to attempt to find a mathematical model for heart-rate (beats per minute), and oxygen-consumption (liters per minute). The models developed can be used to predict heart-rate and oxygen-consumption under varying thermal and workloads. Workload was found to correlate more strongly with heart-rate and oxygen-consumption than was heat level. GRA

N75-18886# Army Research Inst. of Environmental Medicine, Natick, Mass.
MILITARY MEDICAL RESEARCH ON HEAT AND COLD

STRESSES TO PERSONNEL Annual Progress Report, 1 Jul. 1973 - 30 Jun. 1974
1 Jul. 1974 163 p refs
(DA Proj. 3A7-62758-A-827; DA Proj. 3A1-61102-B-71R)
(AD-A001543) Avail: NTIS CSCL 06/5

Contents: Medical problems in military Arctic operations; Effects of environmental stress on military performance; Biomedical impact of military clothing and equipment design; Prevention and treatment of disabilities associated with military operations in the cold; Prevention and treatment of disabilities associated with military operations in the heat; Prevention and treatment of disabilities associated with military operations at high terrestrial elevations; The relationship between physical exercise and the health, efficiency and morale of the soldier; Development of cold injury models; Development of performance measures for simulated and real military team tasks; Biological processes that limit heavy physical work ability of the soldier. GRA

N75-18887# Mayo Foundation, Rochester, Minn. Dept. of Physiology and Biophysics.
PROTECTION OF THE CARDIOPULMONARY SYSTEMS AGAINST THE INJURIOUS EFFECTS OF ACCELERATION Interim Report, 1 Jul. 1973 - 30 Jun. 1974
Earl H. Wood, James F. Greenleaf, and Peter A. Chevalier 1974 28 p refs
(Contract F44620-71-C-0069; AF Proj. 9777)
(AD-A000480; AFOSR-74-1622TR) Avail: NTIS CSCL 06/19

The report gives a brief summary of individual studies and activities performed during the past year. Progress accomplished centered primarily on application of recently developed techniques to the study of the spatial distribution of strains and ventilation within the lung parenchyma. It is clear that the parenchymal marker and three-dimensional reconstruction techniques described will add significant new information to understanding of dynamic regional stress-strain relationships throughout the lung and will provide the methodology to study the effects on regional lung function of alterations in these parameters induced by changes in the gravitational-inertial force environment. Author (GRA)

N75-18888# Technology, Inc., San Antonio, Tex.
OCULAR EFFECTS OF ULTRAVIOLET LASER RADIATION Interim Report, Feb. 1973 - Feb. 1974
Joseph Zuclich Sep. 1974 29 p refs
(Contract F41609-73-C-0017; AF Proj. 6301)
(AD-A000933; SAM-TR-74-32) Avail: NTIS CSCL 06/18

The report presents an analysis of ocular hazards from ultraviolet laser radiation. Absorption properties of primate-eye components are reviewed, cellular structure and molecular composition of pertinent ocular layers discussed, and absorption of these layers explained in terms of their molecular properties. Potential sites of ocular damage from various UV-wavelength ranges are identified. GRA

N75-18889# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
CONCEPTS OF THE TERMS SUSCEPTIBILITY AND RESISTANCE AS THEY RELATE TO HEARING DAMAGE DUE TO NOISE
K. Sedlacek 1 Nov. 1974 14 p Transl. into ENGLISH from Cesk. Otolaryngol. (Prague), v. 21, no. 1, 1972 p 4-9
(AD-A001152; FTD-HC-23-2783-74) Avail: NTIS CSCL 06/5

The author's definition of susceptibility and resistance is formulated on the basis of correlation between the injuring factor (noxa) and its effect by means of the probability that is expressed as the difference between the expected value given by the regression line and real value of the hearing loss. This defines susceptibility and, similarly, resistance as the probability of a given loss with the presumption of the average reactivity of the given person. Examples of application of such an evaluation of receptivity are shown. GRA

N75-18890 Illinois Univ., Champaign.
EFFECTS OF GROUND BASED AIRCRAFT SIMULATOR MOTION CONDITIONS UPON PREDICTION OF PILOT PROFICIENCY Ph.D. Thesis
Jefferson Michael Koonce 1974 244 p
Avail: Univ. Microfilms Order No. 75-345

Three groups of thirty pilots with multi-engine and instrument ratings performed a simulated flight mission on a General Aviation Trainer. The experimental conditions for the groups differed in terms of the type of motion: no motion, sustained linear and scaled-down analog motion, and washout motion. Each group of pilots then flew the same mission in a light twin-engine aircraft representative of the class of aircraft simulated by the trainer. The results indicate that the proficiency of aircraft pilots can be predicted to a high degree from ground-based simulator performance measures. Of the three simulator motion conditions used greater prediction of operator performance from a simulator to flight can be obtained using sustained cockpit motion than by using washout motion or no motion. There was no significant difference between the predictive validities of performance with no motion and washout motion. The performance measures taken in the simulator tended to be more reliable than those taken in the aircraft because of the elimination of degrading environmental factors and the reduction of safety oriented duties frequently imposed upon the safety observers. Dissert. Abstr.

N75-18891*# Norfolk State Coll., Va.
STANDARDS OF RIDER COMFORT: NOISE, VIBRATION AND AGE OF RIDER AS FACTORS Final Report, Jun. 1973 - Jun. 1974
Robert L. Colegate Jun. 1974 10 p refs
(Grant NGR-47-025-001)
(NASA-CR-136744) Avail: NTIS HC $3.25 CSCL 05E

Psychological responses of bus passengers to noise and vibration in terms of ride quality are studied in a field test. An attempt is made to correlate passenger comfort ratings with the age factor. G.G.

N75-18892*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
RESPONSE TIME TO COLORED STIMULI IN THE FULL VISUAL FIELD
Richard F. Haines, L. Markham Dawson, Terye Galvan, and Lorrie M. Reid Washington Mar. 1975 27 p refs Prepared in cooperation with San Jose State Univ. Foundation, Calif.
(Grant NGL-05-046-002)
(NASA-TN-D-7927; A-5836) Avail: NTIS HC $3.75 CSCL 05E

Peripheral visual response time was measured in seven dark adapted subjects to the onset of small (45' arc diam), brief (50 msec), colored (blue, yellow, green, red) and white stimuli imaged at 72 locations within their binocular field of view. The blue, yellow, and green stimuli were matched for brightness at about 2.6 sub log 10 units above their absolute light threshold, and they appeared at an unexpected time and location. These data were obtained to provide response time and no-response data for use in various design disciplines involving instrument panel layout. The results indicated that the retina possesses relatively concentric regions within each of which mean response time can be expected to be of approximately the same duration. These regions are centered near the fovea and extend farther horizontally than vertically. Mean foveal response time was fastest for yellow and slowest for blue. Three and one-half percent of the total 56,410 trials presented resulted in no-responses. Regardless of stimulus color, the lowest percentage of no-responses occurred within 30 deg arc from the fovea and the highest within 40 deg to 80 deg arc below the fovea. Author

N75-18893# Civil Aeromedical Inst., Oklahoma City, Okla.
AIRCRAFT-PILOT AND OTHER PRE-EMPLOYMENT EXPERIENCE AS FACTORS IN THE SELECTION OF AIR TRAFFIC CONTROLLER TRAINEES
Bart B. Cobb and Peter L. Nelson Sep. 1974 41 p refs
(AD-A001039/7; FAA-AM-74-8) Avail: NTIS HC $3.75 CSCL 05I

Various types of aviation related experience are examined separately and in combination, for prediction of success within the air traffic control system several years after entry into training. The obtained results clearly demonstrate that success (defined as retention status) is far more contingent upon entry age than type of aviation related experience, level of aptitude, or level of education. The findings suggest that ATCS applicants who meet the existing age and aptitude screening standards should not be awarded credit pionts toward their eligiblity ratings for any type experience other than ATC work, that even the latter should be conservatively assessed and weighted in the selection process, and particularly so with respect to military control experience which involved no IFR operations. Author

N75-18894# Civil Aeromedical Inst., Oklahoma City, Okla.
BEHAVIORAL, AUTONOMIC, AND SUBJECTIVE REACTIONS TO LOW AND MODERATE-LEVEL SIMULATED SONIC BOOMS: A REPORT OF TWO EXPERIMENTS AND A GENERAL EVALUATION OF SONIC BOOM STARTLE EFFECTS
Richard I. Thackray, R. Mark Touchstone, and Joe P. Bailey Sep. 1974 19 p refs
(AD-A002265/5; FAA-AM-74-9) Avail: NTIS HC $3.25 CSCL 05J

Two separate studies are reported. The first attempted to determine a sonic boom exposure level below which startle reactions would not occur. Subjects were exposed indoors to six simulated sonic booms having inside sound pressure levels of 74, 71, and 65 dbA. Approximately 20 percent of the subject gave small amplitude arm-hand startle responses to the two higher exposure levels, while none responded to the lowest level. In the second study, subjects were exposed indoors to a series of 12 simulated booms in order to assess habituation effects (indoor sound pressure levels of 81 and 72 dbA). Significant, but not complete, habituation occurred to booms of both levels. Autonomic and eyeblink responses, as well as ratings of subjective annoyance were obtained in both studies. Author

N75-18895# Human Engineering Labs., Aberdeen Proving Ground, Md.
COLOR CODING: A REVIEW OF THE LITERATURE Final Report
Thomas C. Cook Nov. 1974 22 p refs
(AD-A001555; HEL-TN-9-74) Avail: NTIS CSCL 05/5

This literature review has investigated the use of color as a coding technique. Attention was concentrated primarily on the factors directly applicable to visual displays--such as hue, alphabet size, and the general advantages and disadvantages of color codes. The average alphabet size ranges from 8 to 11 hues (three to five for cathode-ray tubes). Color coding is found lacking when operators must make quick, precise identifications. However, color codes are advantageous in highlighting location or for gaining attention. Color also improves human performance when used in conjunction with other coding methods. GRA

N75-18896# Honeywell, Inc., Minneapolis, Minn. Systems and Research Center.
SPATIAL-TEMPORAL INTERACTIONS: CONTRAST SENSITIVITY AS A FUNCTION OF SPATIAL AND TEMPORAL FREQUENCY, LUMINANCE AND STIMULUS POSITION ON THE RETINA Interim Report
Leon G. Williams and Judith M. Erickson Oct. 1974 84 p refs
(Contract N00014-74-C-0076; NR Proj. 215-229)
(AD-A001578; F0259-IR1) Avail: NTIS CSCL 05/10

Constrast sensitivity for gratings sinusoidally modulated in time and space was determined as a function of luminance and stimulus position on the retina. For a given luminance and retinal position, contrast sensitivity as a function of both spatial and temporal frequency defined a contrast sensitivity surface. Luminance and retinal position were found to affect the overall level of sensitivity as well as the shape of the sensitivity surface. The sensitivity to higher spatial frequencies was greatly diminished when the grating was presented off axis. In general, at any given temporal frequency, maximum sensitivity occurred at some middle spatial frequency. The application of the results to the design of displays is discussed. GRA

N75-18897# Dunlap and Associates, Inc., Inglewood, Calif. Western Div.
THE EFFECT OF LIGHTED DECK SHAPE ON NIGHT CARRIER LANDING
Joseph W. Wulfeck, John E. Queen, and William M. Kitz Oct. 1974 57 p refs
(Contract N00014-72-C-0041; NR Proj. 196-115)
(AD-A000486) Avail: NTIS CSCL 05/10

Young male engineering and science students with perceptual and visual skills equivalent to pilots: judged when simulated parallel and tunnel lighted decks looked level from simulated ranges of 1, 3/4 and 1/2 miles and glideslopes of 3.5, 4.0 and 4.5 degrees when the decks were viewed straight on or offset 10 deg. Analysis of variance found deck, range, and subjects to be significant. Generated glideslope appears to be a function of linear perspective of deck shape when perspective cues are liminal, but when perspective cues are sub-liminal, visual angle subtended by the length of the deck is important. (Modified author abstract) GRA

N75-18898# Dunlap and Associates, Inc., Inglewood, Calif. Western Div.
EFFECT OF A PREDICTOR INSTRUMENT ON LEARNING TO LAND A SIMULATED JET TRAINER Final Report
Russell L. Smith, Gail G. Pence, John E. Queen, and Joseph W. Wulfeck 30 Aug. 1974 87 p refs
(Contract F44620-73-C-0014)
(AD-A000586; AFOSR-74-1731TR) Avail: NTIS CSCL 05/9

Use of a predictor display has been shown to reduce the difficulty of complex, manual control, pursuit tracking tasks to the level of simple control. The purpose of the study was to explore adaptive use of a predictor display to promote rapid and accurate learning on conventional tracking tasks, i.e., transfer of training. GRA

N75-18899# Aeronautical Systems Div., Wright-Patterson AFB, Ohio.
A SCORING SYSTEM FOR THE QUANTITATIVE EVALUATION OF PILOT PERFORMANCE DURING INSTRUMENT LANDING SYSTEM (ILS) APPROACHES AND LANDINGS Final Report
Christopher J. Hyatt and Oak H. DeBerg Jul. 1974 15 p refs
(AD-A000422; ASD-TR-74-19) Avail: NTIS CSCL 05/9

The Crew Station Design Facility at Wright-Patterson Air Force Base has developed a quantitative method of evaluating pilot performance during ILS approaches and landings. This has been used and refined over a series of studies. Work is proceeding on further developments of the system to extend its use beyond ILS approaches. Author (GRA)

N75-18900*# Minnesota Univ., St. Paul. Dept. of Food Science and Nutrition.
STORAGE STABILITY AND IMPROVEMENT OF INTERMEDIATE MOISTURE FOODS, PHASE 2. Final Report, Mar. 1973 - Jul. 1974
Theodore P. Labuza 24 Mar. 1975 267 p refs
(Contract NAS9-12560)
(NASA-CR-141663) Avail: NTIS HC $8.50 CSCL 06H

Methods for improvement of shelf-life stability of intermediate moisture foods are considered. It was found that vitamin C is the most limiting vitamin from a nutritional standpoint with its rate of destruction increasing with a sub w. Techniques for microbial challenge studies were developed. It was shown that organisms have a higher growth a sub w limit if the IMF is prepared by the adsorption process and long times are needed for challenge studies. Several alternative antimycotic systems were found. It was also found that the vegetative cells of pathogens have a maximum heat resistance in the IMF a sub w range. If glycols are in the formula, the IMF should have as high an a

sub w as possible. The reverse is true if lipid oxidation occurs. In addition, to prevent rancidity, antioxidants and a low O2 atmosphere are necessary. The package also must be a good moisture barrier. Author

N75-18901# McDonnell-Douglas Astronautics Co., Huntington Beach, Calif. Western Div.

REVERSE OSMOSIS FOR SPACECRAFT WASH WATER RECYCLING HIGH PRESSURE PUMP DEFINITION Research and Development Progress Report

R. E. Shook and G. W. Wells Oct. 1974 99 p refs

(Contract DI-14-30-3062)

(PB-236940/3; Int-OSW-RDPR-74-992) Avail: NTIS HC $4.75 CSCL 13K

A high pressure space applicable reverse osmosis feed pump is proposed through the selection of a concept for detail design. Candidate pumping mechanisms suitable for small flow, high pressure water service are identified. Information on the efficiency, reliability, maintainability, mechanical complexity, sealing methods, valving concepts, lubrication requirements, development requirements, and projected costs was compiled. Seal reliability, materials compatibility, and estimated development cost considerations resulted in the selection of a quintuplex radial piston pump for this application. Summary characteristics of compressed gas and electric motors are prepared. A 400 Hz AC induction motor is selected as best suited to the RO pump drive. GRA

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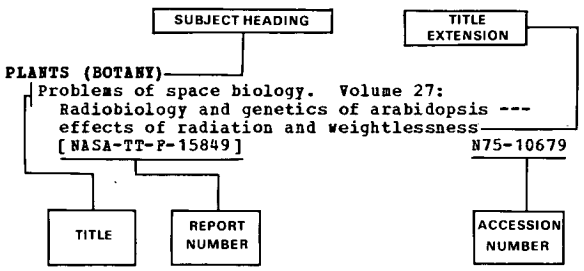

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A

B

C

D

E

F

G

H

J

K

L

M

N

O

R

S

T

W

Y

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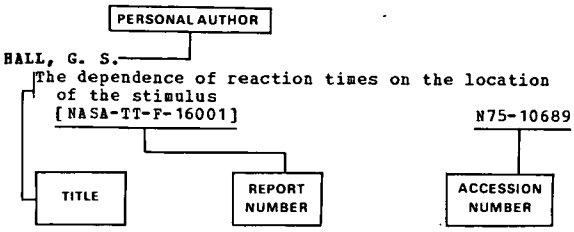

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